

# A KWIC Index to SACLIB Functions

Andreas Neubacher\*

March 12, 1993

## Abstract

This paper solely consists of an automatically generated “KeyWord In Context” index of all functions provided by SACLIB.

### absolute

**ABS** Absolute value.  
**IABSF** Integer absolute value function.  
**IPABS** Integral polynomial absolute value.  
**RNABS** Rational number absolute value.  
**SFRABS** Single-precision floating-point real absolute value.

### adjoin

**MIAIM** Matrix of integers, adjoin identity matrix.  
**VIAZ** Vector of integers, adjoin zeros.

### advance

**AADV** Arithmetic advance.  
**ADV** Advance.  
**ADV2** Advance 2.  
**ADV3** Advance 3.  
**ADV4** Advance 4.

### after

**IPVCHT** Integral polynomial variations after circle to half-plane transformation.

### algebraic

**AFCOMP** Algebraic number field comparison.  
**AFCCR** Algebraic number field element convert representation.  
**AFDIF** Algebraic number field element difference.  
**AFDWRITE** Algebraic number field, decimal write.  
**AFFINT** Algebraic number field element from integer.  
**AFFRN** Algebraic number field element from rational number.  
**AFICR** Algebraic number field element inverse convert representation.  
**AFINV** Algebraic number field element inverse.  
**AFNEG** Algebraic number field negative.  
**AFPAFP** Algebraic number field polynomial algebraic number field element product.  
**AFPAFP** Algebraic number field polynomial algebraic number field element product.

---

\*With the help of one `csh` script, three `awk` scripts, and one `sed` script.

**AFPAFQ** Algebraic number field polynomial algebraic number field element quotient.  
**AFPAFQ** Algebraic number field polynomial algebraic number field element quotient.  
**AFPBRI** Algebraic number field polynomial basis real root isolation.  
**AFPCMV** Algebraic number field polynomial composition in main variable.  
**AFPCR** Algebraic number field polynomial convert representation.  
**AFPDIF** Algebraic number field polynomial difference.  
**AFPDMV** Algebraic number field polynomial derivative, main variable.  
**AFPEMV** Algebraic number field polynomial evaluation of main variable.  
**AFPEV** Algebraic number field polynomial evaluation.  
**AFPFIP** Algebraic number field polynomial from integral polynomial.  
**AFPPRP** Algebraic number field polynomial from rational polynomial.  
**AFPICR** Algebraic number field polynomial inverse convert representation.  
**AFPINT** Algebraic number field polynomial integration.  
**AFPME** Algebraic number field polynomial multiple evaluation.  
**AFPMON** Algebraic number field polynomial monic.  
**AFPNEG** Algebraic number field polynomial negative.  
**AFPNIP** Algebraic number field polynomial normalize to integral polynomial.  
**AFPNORM** Algebraic number field polynomial norm.  
**AFPPR** Algebraic number field polynomial product.  
**AFPQR** Algebraic number field polynomial quotient and remainder.  
**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.  
**AFPRII** Algebraic number field polynomial real root isolation induction.  
**AFPRLS** Algebraic number field polynomial real root list separation.  
**AFPROD** Algebraic number field element product.  
**AFPRRI** Algebraic number field polynomial relative real root isolation.  
**AFPRRS** Algebraic number field polynomial real root separation.  
**AFPSUM** Algebraic number field polynomial sum.  
**AFPWRITE** Algebraic number field polynomial write.  
**AFQ** Algebraic number field quotient.  
**AFSIGN** Algebraic number field sign.  
**AFSUM** Algebraic number field element sum.  
**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.  
**AFUPFAC** Algebraic number field univariate polynomial factorization.  
**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.  
**AFUPGS** Algebraic number field polynomial greatest squarefree divisor.  
**AFUPIIR** Algebraic number field polynomial isolating interval refinement.  
**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.  
**AFUPRB** Algebraic number field univariate polynomial root bound.  
**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.  
**AFUPRICS** Algebraic number field univariate polynomial real root isolation, coefficient sign variation method.

**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.

**AFUPRL** Algebraic number field univariate polynomial, root of a linear polynomial.

**AFUPRLS** Algebraic number field univariate polynomial real root list separation.

**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.

**AFUPRRS** Algebraic number field univariate polynomial real root separation.

**AFUPSF** Algebraic number field univariate polynomial squarefree factorization.

**AFUPSFN** Algebraic number field univariate polynomial squarefree norm.

**AFUPSR** Algebraic number field univariate polynomial, sign at a rational point.

**AFUPVAR** Algebraic number field univariate polynomial variations.

**AFUPWRITE** Algebraic number field univariate polynomial write.

**AFWRITE** Algebraic field element write.

**AIFAN** Algebraic integer from algebraic number.

**AIFAN** Algebraic integer from algebraic number.

**AMPDMV** Algebraic module polynomial derivative, main variable.

**AMPSAFP** Algebraic module polynomial similar to algebraic field polynomial.

**AMPSAFP** Algebraic module polynomial similar to algebraic field polynomial.

**AMSIGN** Algebraic module sign.

**AMSIGNIR** Algebraic module sign, interval refinement.

**AMUPBES** Algebraic module univariate polynomial, binary rational evaluation of sign.

**AMUPBHT** Algebraic module univariate polynomial binary homothetic transformation.

**AMUPIIR** Algebraic module polynomial isolating interval refinement.

**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPMPR** Algebraic module univariate polynomial minimal polynomial of a real root.

**AMUPNT** Algebraic module univariate polynomial negative transformation.

**AMUPRBH** Algebraic module univariate polynomial root bound and homothetic transformation.

**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.

**AMUPRLS** Algebraic module univariate polynomial real root list separation.

**AMUPRRS** Algebraic module univariate polynomial real root separation.

**AMUPSR** Algebraic module univariate polynomial, sign at a rational point.

**AMUPTR** Algebraic module univariate polynomial translation.

**AMUPTR1** Algebraic module univariate polynomial translation by 1.

**AMUPVARIR** Algebraic module univariate polynomial variations, interval

refinement.

**ANDWRITE** Algebraic number decimal write.

**ANFAF** Algebraic number from algebraic number field element.

**ANFAF** Algebraic number from algebraic number field element.

**ANIPE** Algebraic number isolating interval for a primitive element.

**ANPROD** Algebraic number product.

**ANREPE** Algebraic number represent element of a primitive extension.

**ANSUM** Algebraic number sum.

**IPAFME** Integral polynomial, algebraic number field multiple evaluation.

**RPAFME** Rational polynomial, algebraic number field multiple evaluation.

**algorithm**

**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.

**AFUPRCL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.

**IDEGCD** Integer doubly extended greatest common divisor algorithm.

**IEGCD** Integer extended greatest common divisor algorithm.

**IPCRA** Integral polynomial chinese remainder algorithm.

**IPRCL** Integral polynomial real root isolation, Collins-Loos algorithm.

**IPRODK** Integer product, karatsuba algorithm.

**LDSMKB** Linear diophantine system solution, modified Kannan and Bachem algorithm.

**MAIPDE** Matrix of integral polynomials determinant, exact division algorithm.

**MAIPDM** Matrix of integral polynomials determinant, modular algorithm.

**MDCRA** Modular digit chinese remainder algorithm.

**MDLCRA** Modular digit list chinese remainder algorithm.

**MIDCRA** Modular integer digit chinese remainder algorithm.

**MMPDMA** Matrix of modular polynomials determinant, modular algorithm.

**MUPFBL** Modular univariate polynomial factorization-berlekamp algorithm.

**allocation**

**GCAMALLOC** Garbage collected array memory allocation.

**and**

**DAND** Digit and.

**arguments**

**ARGSACLIB** Process the command line arguments.

**arithmetic**

**AADV** Arithmetic advance.

**array**

**GCA2PTR** Convert garbage collected array handle to C pointer.

**GCAFREE** Garbage collected array memory deallocation.

**GCAGET** Garbage collected array get element.

**GCAMALLOC** Garbage collected array memory allocation.

**GCASET** Garbage collected array set element.

**assignment**

**ASSPR** Assignment problem.

**associate**

**RPMAIP** Rational polynomial monic associate of integral polynomial.

**atom**

**AREAD** Atom read.

**AWRITE** Atom write.  
**ISATOM** Test for atom.  
**augmentation**  
**IPSFBA** Integral polynomial squarefree basis augmentation.  
**bachem**  
**LDSMKB** Linear diophantine system solution, modified Kannan and Bachem algorithm.  
**backspace**  
**BKSP** Backspace.  
**base**  
**DLOG2** Digit logarithm, base 2.  
**IFCL2** Integer, floor and ceiling, logarithm, base 2.  
**ILOG2** Integer logarithm, base 2.  
**PFBRE** Polynomial From Base Ring Element.  
**PLBCF** Polynomial leading base coefficient.  
**PTBCF** Polynomial trailing base coefficient.  
**RNFCL2** Rational number floor and ceiling of logarithm, base 2.  
**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.  
**based**  
**LDSSBR** Linear diophantine system solution, based on Rosser ideas.  
**basis**  
**AFPBRI** Algebraic number field polynomial basis real root isolation.  
**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.  
**IPCSFB** Integral polynomial coarsest squarefree basis.  
**IPFSFB** Integral polynomial finest squarefree basis.  
**IPSFBA** Integral polynomial squarefree basis augmentation.  
**ISPSFB** Integral squarefree polynomial squarefree basis.  
**MMDNSB** Matrix of modular digits null-space basis.  
**begin**  
**BEGINSACLIB** Begin SACLIB.  
**berlekamp**  
**MUPBQP** Modular univariate polynomial berlekamp Q polynomials construction.  
**MUPFBL** Modular univariate polynomial factorization-berlekamp algorithm.  
**beta**  
**LBIBMS** List of BETA-integers bubble-merge sort.  
**LBIBS** List of BETA-integers bubble sort.  
**LBIM** List of BETA-integers merge.  
**binary**  
**AMUPBES** Algebraic module univariate polynomial, binary rational evaluation of sign.  
**AMUPBHT** Algebraic module univariate polynomial binary homothetic transformation.  
**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.  
**IPBHT** Integral polynomial binary homothetic transformation.  
**IPBHTLV** Integral polynomial binary homothetic transformation, leading variable.

**IPBHTMV** Integral polynomial binary homothetic transformation, main variable.

**IPBREI** Integral polynomial binary rational evaluation, integral polynomial result.

**IUPBEI** Integral univariate polynomial binary rational evaluation, integer output.

**IUPBES** Integral univariate polynomial binary rational evaluation of sign.

**IUPBHT** Integral univariate polynomial binary homothetic transformation.

**IUPBRE** Integral univariate polynomial binary rational evaluation.

**RNBCR** Rational number binary common representation.

**binomial**

**IBCIND** Integer binomial coefficient induction.

**IBCOEF** Integer binomial coefficient.

**IBCPS** Integer binomial coefficient partial sum.

**PBIN** Polynomial binomial.

**bisection**

**RIB** Rational interval bisection.

**bit**

**BITRAN** Bit, random.

**bound**

**AFUPRB** Algebraic number field univariate polynomial root bound.

**AMUPRBH** Algebraic module univariate polynomial root bound and homothetic transformation.

**IPFCB** Integral polynomial factor coefficient bound.

**IPGFCB** Integral polynomial Gelfond factor coefficient bound.

**IUPRB** Integral univariate polynomial root bound.

**bubble**

**LBIBMS** List of BETA-integers bubble-merge sort.

**LBIBS** List of BETA-integers bubble sort.

**c**

**GCA2PTR** Convert garbage collected array handle to C pointer.

**calculation**

**DPCC** Digit partial cosequence calculation.

**IPRCH** Integral polynomial real root calculation, high precision.

**IPRCHS** Integral polynomial real root calculation, high-precision special.

**IPRCN1** Integral polynomial real root calculation, 1 root.

**IPRCNP** Integral polynomial real root calculation, Newton method preparation.

**cartesian**

**CPLXN** Cartesian product, lexicographically next.

**ceiling**

**IFCL2** Integer, floor and ceiling, logarithm, base 2.

**RNCEIL** Rational number, ceiling of.

**RNFCL2** Rational number floor and ceiling of logarithm, base 2.

**cell**

**LASTCELL** Last cell.

**character**

**CLOUT** Character list out.

**CREAD** Character read.

**CREADB** Character read.

**CWRITE** Character write.  
**IPEXPREADR** Integral polynomial expression read, remove terminating character.  
**LKAHEAD** Character lookahead.  
**characteristic**  
**CSFPAR** Characteristic set from partition.  
**CSINT** Characteristic set intersection.  
**CSSUB** Characteristic set subset.  
**CSUN** Characteristic set union.  
**SFCS** Set from characteristic set.  
**chinese**  
**IPCRA** Integral polynomial chinese remainder algorithm.  
**MDCRA** Modular digit chinese remainder algorithm.  
**MDLCRA** Modular digit list chinese remainder algorithm.  
**MIDCRA** Modular integer digit chinese remainder algorithm.  
**choice**  
**IPCEVP** Integral polynomial, choice of evaluation points.  
**circle**  
**IPVCHT** Integral polynomial variations after circle to half-plane transformation.  
**IUPCHT** Integral univariate polynomial circle to half-plane transformation.  
**clock**  
**ACLOCK** Clock minus garbage collection time.  
**CLOCK** Clock.  
**coarsest**  
**IPCSFB** Integral polynomial coarsest squarefree basis.  
**coefficient**  
**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.  
**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.  
**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.  
**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.  
**IBCIND** Integer binomial coefficient induction.  
**IBCOEF** Integer binomial coefficient.  
**IBCPS** Integer binomial coefficient partial sum.  
**IPFCB** Integral polynomial factor coefficient bound.  
**IPGFCB** Integral polynomial Gelfond factor coefficient bound.  
**PCL** Polynomial coefficient list.  
**PLBCF** Polynomial leading base coefficient.  
**PLDCF** Polynomial leading coefficient.  
**PTBCF** Polynomial trailing base coefficient.  
**coefficients**  
**IPPSC** Integral polynomial principal subresultant coefficients.  
**MCPMV** Matrix of coefficients of polynomials, with respect to main variable.  
**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.  
**cofactor**

**IUPRC** Integral univariate polynomial resultant and cofactor.  
**MUPRC** Modular univariate polynomial resultant and cofactor.

**cofactors**  
**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.  
**IGCDCF** Integer greatest common divisor and cofactors.  
**IPGCDC** Integral polynomial greatest common divisor and cofactors.  
**MPGCDC** Modular polynomial greatest common divisor and cofactors.

**collected**  
**GCA2PTR** Convert garbage collected array handle to C pointer.  
**GCAFREE** Garbage collected array memory deallocation.  
**GCAGET** Garbage collected array get element.  
**GCAMALLOC** Garbage collected array memory allocation.  
**GCASET** Garbage collected array set element.

**collection**  
**ACLOCK** Clock minus garbage collection time.  
**GC** Garbage collection entry-point.  
**GCSI** Garbage collection, system independent.

**collector**  
**GCGLOBAL** Declare a global variable to the Garbage Collector.

**collins**  
**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.  
**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.  
**IPRICL** Integral polynomial real root isolation, Collins-Loos algorithm.

**column**  
**MICINS** Matrix of integers column insertion.  
**MICS** Matrix of integers column sort.  
**MINNCT** Matrix of integers, non-negative column transformation.

**combination**  
**ILCOMB** Integer linear combination.  
**VILCOM** Vector of integers linear combination.

**combine**  
**IPFLC** Integral polynomial factor list combine.

**command**  
**ARGSACLIB** Process the command line arguments.

**common**  
**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.  
**DEGCD** Digit extended greatest common divisor.  
**DGCD** Digit greatest common divisor.  
**IDEGCD** Integer doubly extended greatest common divisor algorithm.  
**IEGCD** Integer extended greatest common divisor algorithm.  
**IGCD** Integer greatest common divisor.  
**IGCDCF** Integer greatest common divisor and cofactors.  
**IHEGCD** Integer half-extended greatest common divisor.  
**ILCM** Integer least common multiple.  
**IPGCDC** Integral polynomial greatest common divisor and cofactors.  
**MPGCDC** Modular polynomial greatest common divisor and cofactors.



**MUPEGC** Modular univariate polynomial extended greatest common divisor.  
**MUPGCD** Modular univariate polynomial greatest common divisor.  
**MUPHEG** Modular univariate polynomial half-extended greatest common divisor.  
**RNBCR** Rational number binary common representation.  
**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.  
**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.

**comparison**

**AFCOMP** Algebraic number field comparison.  
**DVCMP** Degree vector comparison.  
**ICOMP** Integer comparison.  
**RILC** Rational interval length comparison.  
**RNCOMP** Rational number comparison.  
**VCOMP** Vector comparison.

**complex**

**SFCCON** Single-precision floating-point complex conjugation.  
**SFCDIF** Single-precision floating-point complex difference.  
**SFCFR** Single-precision floating-point complex from real.  
**SFCIP** Single-precision floating-point complex, imaginary part.  
**SFCMSQ** Single-precision floating-point complex modulus squared.  
**SFCNEG** Single-precision floating-point complex negation.  
**SFCPR** Single-precision floating-point complex product.  
**SFCQ** Single-precision floating-point complex quotient.  
**SFCRP** Single-precision floating-point complex, real part.  
**SFCSUM** Single-precision floating-point complex sum.

**composition**

**AFPCMV** Algebraic number field polynomial composition in main variable.  
**COMP** Composition.  
**COMP2** Composition 2.  
**COMP3** Composition 3.  
**COMP4** Composition 4.

**concatenation**

**CCONC** Constructive concatenation.  
**CONC** Concatenation.  
**LCONC** List concatenation.

**conjugation**

**SFCCON** Single-precision floating-point complex conjugation.

**constant**

**IPCONST** Integral polynomial constant.  
**PCONST** Polynomial constant. PCPV Polynomial cyclic permutation of variables.

**construction**

**MUPBQP** Modular univariate polynomial berlekamp Q polynomials construction.

**constructive**

**CCONC** Constructive concatenation.  
**CINV** Constructive inverse.

**content**

**IPC** Integral polynomial content.  
**IPCPP** Integral polynomial content and primitive part.  
**IPIC** Integral polynomial integer content.  
**IPICPP** Integral polynomial integer content and primitive part.  
**IPICS** Integral polynomial integer content subroutine.  
**IPSCPP** Integral polynomial sign, content, and primitive part.  
**MPUC** Modular polynomial univariate content.  
**MPUCPP** Modular polynomial univariate content and primitive part.  
**MPUCS** Modular polynomial univariate content subroutine.  
**contents**  
**IPLCPP** Integral polynomial list of contents and primitive parts.  
**conversion**  
**IIC** Isolating interval conversion.  
**convert**  
**AFCR** Algebraic number field element convert representation.  
**AFICR** Algebraic number field element inverse convert representation.  
**AFPCR** Algebraic number field polynomial convert representation.  
**AFPICR** Algebraic number field polynomial inverse convert representation.  
**GCA2PTR** Convert garbage collected array handle to C pointer.  
**cosequence**  
**DPCC** Digit partial cosequence calculation.  
**cyclic**  
**PCONST** Polynomial constant. **PCPV** Polynomial cyclic permutation of variables.  
**PERMCY** Permutation, cyclic.  
**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.  
**deallocation**  
**GCAFREE** Garbage collected array memory deallocation.  
**decimal**  
**AFDWRITE** Algebraic number field, decimal write.  
**ANDWRITE** Algebraic number decimal write.  
**RNDWRITE** Rational number decimal write.  
**declare**  
**GCGLOBAL** Declare a global variable to the Garbage Collector.  
**decomposition**  
**PSDSV** Polynomial special decomposition, specified variable.  
**default**  
**main** Default main routine.  
**degree**  
**DIPDEG** Distributive polynomial degree.  
**DVCMP** Degree vector comparison.  
**IUPFDS** Integral univariate polynomial factor degree set.  
**MUPDDF** Modular univariate polynomial distinct degree factorization.  
**PDEG** Polynomial degree.  
**PDEGSV** Polynomial degree, specified variable.  
**PDEGV** Polynomial degree vector.  
**PMDEG** Polynomial modified degree.  
**denominator**  
**RNDEN** Rational number denominator.

#### dense

**DMPPRD** Dense modular polynomial product.  
**DMPSUM** Dense modular polynomial sum.  
**DMUPNR** Dense modular univariate polynomial natural remainder.  
**DPFP** Dense polynomial from polynomial.  
**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.

#### derivative

**AFPDMV** Algebraic number field polynomial derivative, main variable.  
**AMPDMV** Algebraic module polynomial derivative, main variable.  
**IPDER** Integral polynomial derivative.  
**IPDMV** Integral polynomial derivative, main variable.  
**IPFSD** Integral polynomial factorization, second derivative.  
**IPHDMV** Integral polynomial higher derivative, main variable.  
**IPSFSD** Integral squarefree factorization, second derivative.  
**MUPDER** Modular univariate polynomial derivative.  
**RPDMV** Rational polynomial derivative, main variable.

#### determinant

**MAIPDE** Matrix of integral polynomials determinant, exact division algorithm.  
**MAIPDM** Matrix of integral polynomials determinant, modular algorithm.  
**MMDET** Matrix of modular digits determinant.  
**MMPDMA** Matrix of modular polynomials determinant, modular algorithm.

#### difference

**AFDIF** Algebraic number field element difference.  
**AFPDIF** Algebraic number field polynomial difference.  
**IDIF** Integer difference.  
**IPDIF** Integral polynomial difference.  
**MDDIF** Modular digit difference.  
**MIDIF** Modular integer difference.  
**MIPDIF** Modular integral polynomial difference.  
**MPDIF** Modular polynomial difference.  
**RNDIF** Rational number difference.  
**RPDIF** Rational polynomial difference.  
**SDIFF** Set difference.  
**SFCDIF** Single-precision floating-point complex difference.  
**SFRDIF** Single-precision floating-point real difference.  
**USDIFF** Unordered set difference.  
**VIDIF** Vector of integers difference.

#### digit

**DAND** Digit and.  
**DEGCD** Digit extended greatest common divisor.  
**DGCD** Digit greatest common divisor.  
**DIGIT** Digit.  
**DLOG2** Digit logarithm, base 2.  
**DNIMP** Digit non-implication.  
**DNOT** Digit not.  
**DOR** Digit or.  
**DPCC** Digit partial cosequence calculation.  
**DPGEN** Digit prime generator.

**DPR** Digit product.  
**DQR** Digit quotient and remainder.  
**DRAN** Digit, random.  
**DRANN** Digit, random non-negative.  
**DSQRTF** Digit square root function.  
**GDPGEN** Gaussian digit prime generator.  
**IDIPR2** Integer digit inner product, length 2.  
**IDPR** Integer-digit product.  
**IDQ** Integer-digit quotient.  
**IDQR** Integer-digit quotient and remainder.  
**IDREM** Integer-digit remainder.  
**MDCRA** Modular digit chinese remainder algorithm.  
**MDDIF** Modular digit difference.  
**MDEXP** Modular digit exponentiation.  
**MDHOM** Modular digit homomorphism.  
**MDINV** Modular digit inverse.  
**MDLCRA** Modular digit list chinese remainder algorithm.  
**MDNEG** Modular digit negative.  
**MDPROD** Modular digit product.  
**MDQ** Modular digit quotient.  
**MDRAN** Modular digit, random.  
**MDSUM** Modular digit sum.  
**MIDCRA** Modular integer digit chinese remainder algorithm.  
**MPMDP** Modular polynomial modular digit product.  
**REM** GAMMA-digit remainder.

#### digits

**MMDDDET** Matrix of modular digits determinant.  
**MMDNSB** Matrix of modular digits null-space basis.

#### diophantine

**LDSMKB** Linear diophantine system solution, modified Kannan and Bachem algorithm.  
**LDSSBR** Linear diophantine system solution, based on Rosser ideas.

#### discriminant

**IPDSCR** Integral polynomial discriminant.

#### disjoint

**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.  
**IPIIWS** Integral polynomial isolating intervals weakly disjoint to strongly disjoint.  
**IPIIWS** Integral polynomial isolating intervals weakly disjoint to strongly disjoint.  
**IPRIMW** Integral polynomial real root isolation, modified Uspensky method,

weakly disjoint intervals.

**display**

**DIELOC** Display Input Error Location.

**distinct**

**MUPDDF** Modular univariate polynomial distinct degree factorization.

**SDR** System of distinct representatives.

**distributive**

**DIIPREAD** Distributive integral polynomial read.

**DIIPWRITE** Distributive integral polynomial write.

**DIPDEG** Distributive polynomial degree.

**DIPFP** Distributive polynomial from polynomial.

**DIPINS** Distributive polynomial, insert term.

**DIRPREAD** Distributive rational polynomial read.

**DIRPWRITE** Distributive rational polynomial write.

**IPDWRITE** Integral Polynomial Distributive Write.

**PFDIP** Polynomial from distributive polynomial.

**RPDWRITE** Rational Polynomial Distributive Write.

**divided**

**PDBORD** Polynomial divided by order.

**division**

**IDP2** Integer division by power of 2.

**MAIPDE** Matrix of integral polynomials determinant, exact division algorithm.

**PDPV** Polynomial division by power of variable.

**divisor**

**AFUPGS** Algebraic number field polynomial greatest squarefree divisor.

**divisor**

**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.

**DEGCD** Digit extended greatest common divisor.

**DGCD** Digit greatest common divisor.

**IDEGCD** Integer doubly extended greatest common divisor algorithm.

**IEGCD** Integer extended greatest common divisor algorithm.

**IGCD** Integer greatest common divisor.

**IGCDCF** Integer greatest common divisor and cofactors.

**IHEGCD** Integer half-extended greatest common divisor.

**ILPDS** Integer large prime divisor search.

**IMPDS** Integer medium prime divisor search.

**IPGCDC** Integral polynomial greatest common divisor and cofactors.

**IPPGSD** Integral polynomial primitive greatest squarefree divisor.

**MPGCDC** Modular polynomial greatest common divisor and cofactors.

**MUPEGC** Modular univariate polynomial extended greatest common divisor.

**MUPGCD** Modular univariate polynomial greatest common divisor.

**MUPHEG** Modular univariate polynomial half-extended greatest common divisor.

**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.

**divisors**

**ISPD** Integer small prime divisors.

**double**

**ANPEDE** [Algebraic number primitive element for a double extension.  
**doubly**  
**IDEGCD** Integer doubly extended greatest common divisor algorithm.  
**element**  
**AFCR** Algebraic number field element convert representation.  
**AFDIF** Algebraic number field element difference.  
**AFFINT** Algebraic number field element from integer.  
**AFFRN** Algebraic number field element from rational number.  
**AFICR** Algebraic number field element inverse convert representation.  
**AFINV** Algebraic number field element inverse.  
**AFPAFP** Algebraic number field polynomial algebraic number field element  
product.  
**AFPAFQ** Algebraic number field polynomial algebraic number field element  
quotient.  
**AFPROD** Algebraic number field element product.  
**AFSUM** Algebraic number field element sum.  
**AFWRITE** Algebraic field element write.  
**ANFAF** Algebraic number from algebraic number field element.  
**ANIPE** Algebraic number isolating interval for a primitive element.  
**ANPEDE** [Algebraic number primitive element for a double extension.  
**ANREPE** Algebraic number represent element of a primitive extension.  
**GCAGET** Garbage collected array get element.  
**GCASET** Garbage collected array set element.  
**LEINST** List element insertion.  
**LELTI** List element.  
**LEROT** List element rotation.  
**LIST1** List, 1 element.  
**PFBRE** Polynomial From Base Ring Element.  
**SFIRST** Set first element.  
**SLELTI** Set list element.  
**VIERED** Vector of integers, element reduction.  
**elements**  
**LIST10** List, 10 elements.  
**LIST2** List, 2 elements.  
**LIST3** List, 3 elements.  
**LIST4** List, 4 elements.  
**LIST5** List, 5 elements.  
**empty**  
**ISLIST** Test for non-empty list.  
**ISNIL** Test for empty list.  
**end**  
**ENDSACLIB** End saclib.  
**entry**  
**GC** Garbage collection entry-point.  
**equal**  
**EQUAL** Equal.  
**equality**  
**SEQUAL** Set equality.  
**equation**  
**MIPISE** Modular integral polynomial mod ideal, solution of equation.

**MIUPSE** Modular integral univariate polynomial, solution of equation.

**error**

**DIELOC** Display Input Error Location.

**evaluation**

**AFPEMV** Algebraic number field polynomial evaluation of main variable.

**AFPEV** Algebraic number field polynomial evaluation.

**AFPME** Algebraic number field polynomial multiple evaluation.

**AMUPBES** Algebraic module univariate polynomial, binary rational evaluation of sign.

**IPAFME** Integral polynomial, algebraic number field multiple evaluation.

**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.

**IPBREI** Integral polynomial binary rational evaluation, integral polynomial result.

**IPCEVP** Integral polynomial, choice of evaluation points.

**IPEMV** Integral polynomial evaluation of main variable.

**IPEVAL** Integral polynomial evaluation.

**IUPBEI** Integral univariate polynomial binary rational evaluation, integer output.

**IUPBES** Integral univariate polynomial binary rational evaluation of sign.

**IUPBRE** Integral univariate polynomial binary rational evaluation.

**MMPEV** Matrix of modular polynomials evaluation.

**MPEMV** Modular polynomial evaluation of main variable.

**MPEVAL** Modular polynomial evaluation.

**RPAFME** Rational polynomial, algebraic number field multiple evaluation.

**RPEMV** Rational polynomial evaluation, main variable.

**even**

**EVEN** EVEN.

**IEVEN** Integer even.

**exact**

**MAIPDE** Matrix of integral polynomials determinant, exact division algorithm.

**exponential**

**EXPF** Exponential function.

**exponentiation**

**IEXP** Integer exponentiation.

**IPEXP** Integral polynomial exponentiation.

**MDEXP** Modular digit exponentiation.

**MIEXP** Modular integer exponentiation.

**MPEXP** Modular polynomial exponentiation.

**expression**

**IPEXPREAD** Integral polynomial expression read.

**IPEXPREADR** Integral polynomial expression read, remove terminating character.

**RPEXPREAD** Rational polynomial expression read.

**extended**

**DEGCD** Digit extended greatest common divisor.

**IDEGCD** Integer doubly extended greatest common divisor algorithm.

**IEGCD** Integer extended greatest common divisor algorithm.

**IHEGCD** Integer half-extended greatest common divisor.

**MUPEGC** Modular univariate polynomial extended greatest common divisor.  
**MUPHEG** Modular univariate polynomial half-extended greatest common divisor.  
**extension**  
**ANPEDE** [Algebraic number primitive element for a double extension.  
**ANREPE** Algebraic number represent element of a primitive extension.  
**extent**  
**EXTENT** Extent.  
**factor**  
**IPFACTREAD** Integral polynomial factor read.  
**IPFCB** Integral polynomial factor coefficient bound.  
**IPFLC** Integral polynomial factor list combine.  
**IPGFCEB** Integral polynomial Gelfond factor coefficient bound.  
**IUPFDS** Integral univariate polynomial factor degree set.  
**RPFACREAD** Rational polynomial factor read.  
**factorial**  
**IFACTL** Integer factorial.  
**factorization**  
**AFUPFAC** Algebraic number field univariate polynomial factorization.  
**AFUPSF** Algebraic number field univariate polynomial squarefree factorization.  
**IFACT** Integer factorization.  
**IPFAC** Integral polynomial factorization.  
**IPFSD** Integral polynomial factorization, second derivative.  
**IPSF** Integral polynomial squarefree factorization.  
**IPSFSD** Integral squarefree factorization, second derivative.  
**ISFPF** Integral squarefree polynomial factorization.  
**IUPFAC** Integral univariate polynomial factorization.  
**IUSFPF** Integral univariate squarefree polynomial factorization.  
**MUPDDF** Modular univariate polynomial distinct degree factorization.  
**MUPFBL** Modular univariate polynomial factorization-berlekamp algorithm.  
**MUPFS** Modular univariate polynomial factorization, special.  
**MUPSFF** Modular univariate polynomial squarefree factorization.  
**failure**  
**FAIL** Failure handler.  
**fermat**  
**FRESL** Fermat residue list.  
**FRLSM** Fermat residue list, single modulus.  
**field**  
**AFCOMP** Algebraic number field comparison.  
**AFCCR** Algebraic number field element convert representation.  
**AFDIF** Algebraic number field element difference.  
**AFDWRITE** Algebraic number field, decimal write.  
**AFFINT** Algebraic number field element from integer.  
**AFFRN** Algebraic number field element from rational number.  
**AFICR** Algebraic number field element inverse convert representation.  
**AFINV** Algebraic number field element inverse.  
**AFNEG** Algebraic number field negative.  
**AFPAFP** Algebraic number field polynomial algebraic number field element product.



**AFPAFP** Algebraic number field polynomial algebraic number field element product.  
**AFPAFQ** Algebraic number field polynomial algebraic number field element quotient.  
**AFPAFQ** Algebraic number field polynomial algebraic number field element quotient.  
**AFPBRI** Algebraic number field polynomial basis real root isolation.  
**AFPCMV** Algebraic number field polynomial composition in main variable.  
**AFPCR** Algebraic number field polynomial convert representation.  
**AFPDIF** Algebraic number field polynomial difference.  
**AFPDMV** Algebraic number field polynomial derivative, main variable.  
**AFPEMV** Algebraic number field polynomial evaluation of main variable.  
**AFPEV** Algebraic number field polynomial evaluation.  
**AFPIFIP** Algebraic number field polynomial from integral polynomial.  
**AFPIFRP** Algebraic number field polynomial from rational polynomial.  
**AFPICR** Algebraic number field polynomial inverse convert representation.  
**AFPINT** Algebraic number field polynomial integration.  
**AFPME** Algebraic number field polynomial multiple evaluation.  
**AFPMON** Algebraic number field polynomial monic.  
**AFPNEG** Algebraic number field polynomial negative.  
**AFPNIP** Algebraic number field polynomial normalize to integral polynomial.  
**AFPNORM** Algebraic number field polynomial norm.  
**AFPPR** Algebraic number field polynomial product.  
**AFPQR** Algebraic number field polynomial quotient and remainder.  
**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.  
**AFPRII** Algebraic number field polynomial real root isolation induction.  
**AFPRLS** Algebraic number field polynomial real root list separation.  
**AFPROD** Algebraic number field element product.  
**AFPRRI** Algebraic number field polynomial relative real root isolation.  
**AFPRRS** Algebraic number field polynomial real root separation.  
**AFPSUM** Algebraic number field polynomial sum.  
**AFPWRITE** Algebraic number field polynomial write.  
**AFQ** Algebraic number field quotient.  
**AFSIGN** Algebraic number field sign.  
**AFSUM** Algebraic number field element sum.  
**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.  
**AFUPFAC** Algebraic number field univariate polynomial factorization.  
**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.  
**AFUPGS** Algebraic number field polynomial greatest squarefree divisor.  
**AFUPIIR** Algebraic number field polynomial isolating interval refinement.  
**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.  
**AFUPRB** Algebraic number field univariate polynomial root bound.  
**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.

**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.  
**AFUPRL** Algebraic number field univariate polynomial, root of a linear polynomial.  
**AFUPRLS** Algebraic number field univariate polynomial real root list separation.  
**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.  
**AFUPRRS** Algebraic number field univariate polynomial real root separation.  
**AFUPSF** Algebraic number field univariate polynomial squarefree factorization.  
**AFUPSFN** Algebraic number field univariate polynomial squarefree norm.  
**AFUPSR** Algebraic number field univariate polynomial, sign at a rational point.  
**AFUPVAR** Algebraic number field univariate polynomial variations.  
**AFUPWRITE** Algebraic number field univariate polynomial write.  
**AFWRITE** Algebraic field element write.  
**AMPSAFP** Algebraic module polynomial similar to algebraic field polynomial.  
**ANFAF** Algebraic number from algebraic number field element.  
**IPAFME** Integral polynomial, algebraic number field multiple evaluation.  
**RPAFME** Rational polynomial, algebraic number field multiple evaluation.  
**finest**  
**IPFSFB** Integral polynomial finest squarefree basis.  
**first**  
**FIRST** First.  
**FIRST2** First 2.  
**FIRST3** First 3.  
**FIRST4** First 4.  
**SFIRST** Set first element.  
**floating**  
**SFCCON** Single-precision floating-point complex conjugation.  
**SFCDIF** Single-precision floating-point complex difference.  
**SFCFR** Single-precision floating-point complex from real.  
**SFCIP** Single-precision floating-point complex, imaginary part.  
**SFCMSQ** Single-precision floating-point complex modulus squared.  
**SFCNEG** Single-precision floating-point complex negation.  
**SFCPR** Single-precision floating-point complex product.  
**SFCQ** Single-precision floating-point complex quotient.  
**SFCRP** Single-precision floating-point complex, real part.  
**SFCSUM** Single-precision floating-point complex sum.  
**SFIFI** Single-precision floating-point interval from integer.  
**SFRABS** Single-precision floating-point real absolute value.  
**SFRDIF** Single-precision floating-point real difference.  
**SFRLS** Single-precision floating-point real number lower sum.  
**SFRNEG** Single-precision floating-point real negation.  
**SFRPR** Single-precision floating-point real product.  
**SFRQ** Single-precision floating-point real quotient.  
**SFRSUM** Single-precision floating-point real sum.  
**floor**

**IFCL2** Integer, floor and ceiling, logarithm, base 2.  
**RNFCL2** Rational number floor and ceiling of logarithm, base 2.  
**RNFLOr** Rational number, floor of.

**flush**  
**FILINE** Flush the input stream line.

**fourth**  
**FOURTH** Fourth.

**from**  
**AFFINT** Algebraic number field element from integer.  
**AFFRN** Algebraic number field element from rational number.  
**AFPFIP** Algebraic number field polynomial from integral polynomial.  
**AFPFRR** Algebraic number field polynomial from rational polynomial.  
**AIFAN** Algebraic integer from algebraic number.  
**ANFAF** Algebraic number from algebraic number field element.  
**CSFPAR** Characteristic set from partition.  
**DIPFP** Distributive polynomial from polynomial.  
**DPFP** Dense polynomial from polynomial.  
**IPFRP** Integral polynomial from rational polynomial.  
**IPSIFI** Integral polynomial standard isolating interval from isolating interval.  
**LFS** List from String.  
**MIPFSM** Modular integral polynomial from symmetric modular.  
**PFBRE** Polynomial From Base Ring Element.  
**PFDP** Polynomial from distributive polynomial.  
**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.  
**PUPF** Polynomial, univariate, from polynomial.  
**RNINT** Rational number from integer.  
**RPFIP** Rational polynomial from integral polynomial.  
**SFCFR** Single-precision floating-point complex from real.  
**SFCS** Set from characteristic set.  
**SFIFI** Single-precision floating-point interval from integer.  
**SMFMI** Symmetric modular from modular integer.  
**SMFMIP** Symmetric modular from modular integral polynomial.

**function**  
**DSQRTF** Digit square root function.  
**EXPF** Exponential function.  
**IABSF** Integer absolute value function.  
**ISIGNF** Integer sign function.

**gamma**  
**GREAD** Gamma-integer read.  
**GWRITE** Gamma-integer write.  
**REM** GAMMA-digit remainder.

**garbage**  
**ACLOCK** Clock minus garbage collection time.  
**GC** Garbage collection entry-point.  
**GCA2PTR** Convert garbage collected array handle to C pointer.  
**GCAFREE** Garbage collected array memory deallocation.  
**GCAGET** Garbage collected array get element.  
**GCAMALLOC** Garbage collected array memory allocation.  
**GCASET** Garbage collected array set element.

**GCGLOBAL** Declare a global variable to the Garbage Collector.  
**GCSI** Garbage collection, system independent.

**gaussian**  
**GDPGEN** Gaussian digit prime generator.

**gca**  
**ISGCA** Test for GCA handle.

**gelfond**  
**IPGFCB** Integral polynomial Gelfond factor coefficient bound.

**general**  
**IPGSUB** Integral polynomial general substitution.

**generator**  
**DPGEN** Digit prime generator.  
**GDPGEN** Gaussian digit prime generator.

**get**  
**GCAGET** Garbage collected array get element.

**global**  
**GCGLOBAL** Declare a global variable to the Garbage Collector.

**greatest**  
**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.  
**AFUPGS** Algebraic number field polynomial greatest squarefree divisor.  
**DEGCD** Digit extended greatest common divisor.  
**DGCD** Digit greatest common divisor.  
**IDEGCD** Integer doubly extended greatest common divisor algorithm.  
**IEGCD** Integer extended greatest common divisor algorithm.  
**IGCD** Integer greatest common divisor.  
**IGCDCF** Integer greatest common divisor and cofactors.  
**IHEGCD** Integer half-extended greatest common divisor.  
**IPGCD** Integral polynomial greatest common divisor and cofactors.  
**IPPGSD** Integral polynomial primitive greatest squarefree divisor.  
**MPGCD** Modular polynomial greatest common divisor and cofactors.  
**MUPEGC** Modular univariate polynomial extended greatest common divisor.  
**MUPGCD** Modular univariate polynomial greatest common divisor.  
**MUPHEG** Modular univariate polynomial half-extended greatest common divisor.  
**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.

**half**  
**IHEGCD** Integer half-extended greatest common divisor.  
**IPVCHT** Integral polynomial variations after circle to half-plane transformation.  
**IUPCHT** Integral univariate polynomial circle to half-plane transformation.  
**MUPHEG** Modular univariate polynomial half-extended greatest common divisor.

**handle**  
**GCA2PTR** Convert garbage collected array handle to C pointer.  
**ISGCA** Test for GCA handle.

**handler**  
**FAIL** Failure handler.

**hensel**

**IPIQH** Integral polynomial mod ideal quadratic hensel lemma.  
**IUPQH** Integral univariate polynomial quadratic hensel lemma.  
**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. **IUPQS**  
 Integral univariate polynomial quotient substitution.  
**MPIQH** Modular polynomial mod ideal, quadratic Hensel lemma.  
**MPIQHL** Modular polynomial mod ideal quadratic hensel lemma, list.  
**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single  
 variable.

**high**  
**IPRCH** Integral polynomial real root calculation, high precision.  
**IPRCHS** Integral polynomial real root calculation, high-precision special.

**higher**  
**IPHDMV** Integral polynomial higher derivative, main variable.

**homomorphism**  
**IPIHOM** Integral polynomial mod ideal homomorphism.  
**MAIPHM** Matrix of integral polynomials homomorphism.  
**MDHOM** Modular digit homomorphism.  
**MIHOM** Modular integer homomorphism.  
**MIPHOM** Modular integral polynomial homomorphism.  
**MPHOM** Modular polynomial homomorphism.

**homothetic**  
**AMUPBHT** Algebraic module univariate polynomial binary homothetic trans-  
 formation.  
**AMUPRBH** Algebraic module univariate polynomial root bound and homo-  
 thetic transformation.  
**IPBHT** Integral polynomial binary homothetic transformation.  
**IPBHTLV** Integral polynomial binary homothetic transformation, leading vari-  
 able.  
**IPBHTMV** Integral polynomial binary homothetic transformation, main vari-  
 able.  
**IUPBHT** Integral univariate polynomial binary homothetic transformation.  
**IUPIHT** Integral univariate polynomial integer homothetic transformation.

**ideal**  
**IPIHOM** Integral polynomial mod ideal homomorphism.  
**IPIPR** Integral polynomial mod ideal product.  
**IPIQH** Integral polynomial mod ideal quadratic hensel lemma.  
**MIPIPR** Modular integral polynomial mod ideal product.  
**MIPISE** Modular integral polynomial mod ideal, solution of equation.  
**MMPIQR** Modular monic polynomial mod ideal quotient and remainder.  
**MPIQH** Modular polynomial mod ideal, quadratic Hensel lemma.  
**MPIQHL** Modular polynomial mod ideal quadratic hensel lemma, list.  
**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single  
 variable.

**ideas**  
**LDSSBR** Linear diophantine system solution, based on Rosser ideas.

**identity**  
**MIAIM** Matrix of integers, adjoin identity matrix.

**imaginary**  
**SFCIP** Single-precision floating-point complex, imaginary part.

**implication**

**DNIMP** Digit non-implication.

**in**

**AFPCMV** Algebraic number field polynomial composition in main variable.

**independent**

**GCSI** Garbage collection, system independent.

**induction**

**AFPRII** Algebraic number field polynomial real root isolation induction.

**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.

**IBCIND** Integer binomial coefficient induction.

**IPRII** Integral polynomial real root isolation induction.

**information**

**INFOSACLIB** Write out usage information for SACLIB.

**inner**

**IDIPR2** Integer digit inner product, length 2.

**VMPIP** Vector of modular polynomial inner product.

**input**

**DIELOC** Display Input Error Location.

**FILINE** Flush the input stream line.

**insert**

**DIPINS** Distributive polynomial, insert term.

**insertion**

**LEINST** List element insertion.

**LINS** List insertion.

**LINSRT** List insertion.

**MICINS** Matrix of integers column insertion.

**integer**

**AFFINT** Algebraic number field element from integer.

**AIFAN** Algebraic integer from algebraic number.

**GREAD** Gamma-integer read.

**GWRITE** Gamma-integer write.

**IABSF** Integer absolute value function.

**IBCIND** Integer binomial coefficient induction.

**IBCOEF** Integer binomial coefficient.

**IBCPS** Integer binomial coefficient partial sum.

**ICOMP** Integer comparison.

**IDEGCD** Integer doubly extended greatest common divisor algorithm.

**IDIF** Integer difference.

**IDIPR2** Integer digit inner product, length 2.

**IDP2** Integer division by power of 2.

**IDPR** Integer-digit product.

**IDQ** Integer-digit quotient.

**IDQR** Integer-digit quotient and remainder.

**IDREM** Integer-digit remainder.

**IEGCD** Integer extended greatest common divisor algorithm.

**IEVEN** Integer even.

**IEXP** Integer exponentiation.

**IFACT** Integer factorization.

**IFACTL** Integer factorial.

**IFCL2** Integer, floor and ceiling, logarithm, base 2.

**IGCD** Integer greatest common divisor.  
**IGCDCF** Integer greatest common divisor and cofactors.  
**IHEGCD** Integer half-extended greatest common divisor.  
**ILCM** Integer least common multiple.  
**ILCOMB** Integer linear combination.  
**ILOG2** Integer logarithm, base 2.  
**ILPDS** Integer large prime divisor search.  
**ILWRITE** Integer list write.  
**IMAX** Integer maximum.  
**IMIN** Integer minimum.  
**IMP2** Integer multiplication by power of 2.  
**IMPDS** Integer medium prime divisor search.  
**INEG** Integer negation.  
**IODD** Integer odd.  
**IORD2** Integer, order of 2.  
**IPIC** Integral polynomial integer content.  
**IPICPP** Integral polynomial integer content and primitive part.  
**IPICS** Integral polynomial integer content subroutine.  
**IPIP** Integral polynomial integer product.  
**IPIPP** Integral polynomial integer primitive part.  
**IPIQ** Integral polynomial integer quotient.  
**IPOWER** Integer power.  
**IPROD** Integer product.  
**IPRODK** Integer product, karatsuba algorithm.  
**IQ** Integer quotient.  
**IQR** Integer quotient and remainder.  
**IRAND** Integer, random.  
**IREAD** Integer read.  
**IREM** Integer remainder.  
**IROOT** Integer root.  
**ISEG** Integer segmentation.  
**ISIGNF** Integer sign function.  
**ISPD** Integer small prime divisors.  
**ISPT** Integer selfridge primality test.  
**ISQRT** Integer square root.  
**ISSUM** Integer shifted sum.  
**ISUM** Integer sum.  
**ITRUNC** Integer truncation.  
**IUPBEI** Integral univariate polynomial binary rational evaluation, integer output.  
**IUPIHT** Integral univariate polynomial integer homothetic transformation.  
**IWRITE** Integer write.  
**MIDCRA** Modular integer digit chinese remainder algorithm.  
**MIDIF** Modular integer difference.  
**MIEXP** Modular integer exponentiation.  
**MIHOM** Modular integer homomorphism.  
**MIINV** Modular integer inverse.  
**MINEG** Modular integer negation.  
**MIPROD** Modular integer product.  
**MIQ** Modular integer quotient.

**MIRAN** Modular integer, random.  
**MISUM** Modular integer sum.  
**RNINT** Rational number from integer.  
**SFIFI** Single-precision floating-point interval from integer.  
**SMFMI** Symmetric modular from modular integer.

#### integers

**LBIBMS** List of BETA-integers bubble-merge sort.  
**LBIBS** List of BETA-integers bubble sort.  
**LBIM** List of BETA-integers merge.  
**MIAIM** Matrix of integers, adjoin identity matrix.  
**MICINS** Matrix of integers column insertion.  
**MICS** Matrix of integers column sort.  
**MINNCT** Matrix of integers, non-negative column transformation.  
**VIAZ** Vector of integers, adjoin zeros.  
**VIDIF** Vector of integers difference.  
**VIERED** Vector of integers, element reduction.  
**VILCOM** Vector of integers linear combination.  
**VINEG** Vector of integers negation.  
**VISPR** Vector of integers scalar product.  
**VISUM** Vector of integers sum.  
**VIUT** Vector of integers, unimodular transformation.

#### integral

**AFPFIP** Algebraic number field polynomial from integral polynomial.  
**AFPNI** Algebraic number field polynomial normalize to integral polynomial.  
**DIIPREAD** Distributive integral polynomial read.  
**DIIPWRITE** Distributive integral polynomial write.  
**IPABS** Integral polynomial absolute value.  
**IPAFME** Integral polynomial, algebraic number field multiple evaluation.  
**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.  
**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.  
**IPBHT** Integral polynomial binary homothetic transformation.  
**IPBHTLV** Integral polynomial binary homothetic transformation, leading variable.  
**IPBHTMV** Integral polynomial binary homothetic transformation, main variable.  
**IPBREI** Integral polynomial binary rational evaluation, integral polynomial result.  
**IPBREI** Integral polynomial binary rational evaluation, integral polynomial result.  
**IPC** Integral polynomial content.  
**IPCEVP** Integral polynomial, choice of evaluation points.  
**IPCONST** Integral polynomial constant.  
**IPCPP** Integral polynomial content and primitive part.  
**IPCRA** Integral polynomial chinese remainder algorithm.  
**IPCSFB** Integral polynomial coarsest squarefree basis.  
**IPDER** Integral polynomial derivative.  
**IPDIF** Integral polynomial difference.  
**IPDMV** Integral polynomial derivative, main variable.



**IPDSCR** Integral polynomial discriminant.  
**IPDWRITE** Integral Polynomial Distributive Write.  
**IPEMV** Integral polynomial evaluation of main variable.  
**IPEVAL** Integral polynomial evaluation.  
**IPEXP** Integral polynomial exponentiation.  
**IPEXPREAD** Integral polynomial expression read.  
**IPEXPREADR** Integral polynomial expression read, remove terminating character.  
**IPFAC** Integral polynomial factorization.  
**IPFACTREAD** Integral polynomial factor read.  
**IPFCB** Integral polynomial factor coefficient bound.  
**IPFLC** Integral polynomial factor list combine.  
**IPFRP** Integral polynomial from rational polynomial.  
**IPFSD** Integral polynomial factorization, second derivative.  
**IPFSFB** Integral polynomial finest squarefree basis.  
**IPGCDC** Integral polynomial greatest common divisor and cofactors.  
**IPGFCB** Integral polynomial Gelfond factor coefficient bound.  
**IPGSUB** Integral polynomial general substitution.  
**IPHDMV** Integral polynomial higher derivative, main variable.  
**IPIC** Integral polynomial integer content.  
**IPICPP** Integral polynomial integer content and primitive part.  
**IPICS** Integral polynomial integer content subroutine.  
**IPIHOM** Integral polynomial mod ideal homomorphism.  
**IPIIWS** Integral polynomial isolating intervals weakly disjoint to strongly disjoint.  
**IPINT** Integral polynomial integration.  
**IPIP** Integral polynomial integer product.  
**IPIPP** Integral polynomial integer primitive part.  
**IPIPR** Integral polynomial mod ideal product.  
**IPIQ** Integral polynomial integer quotient.  
**IPIQH** Integral polynomial mod ideal quadratic hensel lemma.  
**IPLCPP** Integral polynomial list of contents and primitive parts.  
**IPLRRI** Integral polynomial list real root isolation.  
**IPMAXN** Integral polynomial maximum norm.  
**IPNEG** Integral polynomial negative.  
**IPNT** Integral polynomial negative transformation.  
**IPONE** Integral polynomial one.  
**IPP2P** Integral polynomial power of 2 product.  
**IPPGSD** Integral polynomial primitive greatest squarefree divisor.  
**IPPOWREAD** Integral polynomial power read.  
**IPPP** Integral polynomial primitive part.  
**IPPROD** Integral polynomial product.  
**IPPSC** Integral polynomial principal subresultant coefficients.  
**IPPSR** Integral polynomial pseudo-remainder.  
**IPQ** Integral polynomial quotient.  
**IPQR** Integral polynomial quotient and remainder.  
**IPRAN** Integral polynomial, random.  
**IPRCH** Integral polynomial real root calculation, high precision.  
**IPRCHS** Integral polynomial real root calculation, high-precision special.  
**IPRCN1** Integral polynomial real root calculation, 1 root.

**IPRCNP** Integral polynomial real root calculation, Newton method preparation.  
**IPREAD** Integral polynomial read.  
**IPRES** Integral polynomial resultant.  
**IPRICL** Integral polynomial real root isolation, Collins-Loos algorithm.  
**IPRIM** Integral polynomial real root isolation, modified Uspensky method.  
**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.  
**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.  
**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.  
**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.  
**IPRPRS** Integral polynomial reduced polynomial remainder sequence.  
**IPRRII** Integral polynomial real root isolation induction.  
**IPRRLS** Integral polynomial real root list separation.  
**IPRRRI** Integral polynomial relative real root isolation.  
**IPRRS** Integral polynomial real root separation.  
**IPSCPP** Integral polynomial sign, content, and primitive part.  
**IPSF** Integral polynomial squarefree factorization.  
**IPSFBA** Integral polynomial squarefree basis augmentation.  
**IPSFSD** Integral squarefree factorization, second derivative.  
**IPSIFI** Integral polynomial standard isolating interval from isolating interval.  
**IPSIGN** Integral polynomial sign.  
**IPSMV** Integral polynomial substitution for main variable.  
**IPSPRS** Integral polynomial subresultant polynomial remainder sequence.  
**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.  
**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.  
**IPSRP** Integral polynomial similar to rational polynomial.  
**IPSUB** Integral polynomial substitution.  
**IPSUM** Integral polynomial sum.  
**IPSUMN** Integral polynomial sum norm.  
**IPTERMREAD** Integral polynomial term read.  
**IPTPR** Integral polynomial truncated product.  
**IPTR** Integral polynomial translation, specified variable.  
**IPTR1** Integral polynomial translation by one, specified variable.  
**IPTR1LV** Integral polynomial translation by one, leading variable.  
**IPTRAN** Integral polynomial translation.  
**IPTRLV** Integral polynomial translation, leading variable.  
**IPTRMV** Integral polynomial translation, main variable.  
**IPTRUN** Integral polynomial truncation.  
**IPVCHT** Integral polynomial variations after circle to half-plane transformation.  
**IPWRITE** Integral polynomial write.  
**ISFPF** Integral squarefree polynomial factorization.  
**ISFPIR** Integral squarefree polynomial isolating interval refinement.  
**ISPSFB** Integral squarefree polynomial squarefree basis.  
**IUPBEI** Integral univariate polynomial binary rational evaluation, integer out-

put.

- IUPBES** Integral univariate polynomial binary rational evaluation of sign.
- IUPBHT** Integral univariate polynomial binary homothetic transformation.
- IUPBRE** Integral univariate polynomial binary rational evaluation.
- IUPCHT** Integral univariate polynomial circle to half-plane transformation.
- IUPFAC** Integral univariate polynomial factorization.
- IUPFDS** Integral univariate polynomial factor degree set.
- IUPIHT** Integral univariate polynomial integer homothetic transformation.
- IUPIIR** Integral univariate polynomial isolating interval refinement.
- IUPNT** Integral univariate polynomial negative transformation.
- IUPQH** Integral univariate polynomial quadratic hensel lemma.
- IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
Integral univariate polynomial quotient substitution.
- IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
Integral univariate polynomial quotient substitution.
- IUPRB** Integral univariate polynomial root bound.
- IUPRC** Integral univariate polynomial resultant and cofactor.
- IUPRLP** Integral univariate polynomial, root of a linear polynomial.
- IUPSR** Integral univariate polynomial semi-remainder.
- IUPTPR** Integral univariate polynomial truncated product.
- IUPTR** Integral univariate polynomial translation.
- IUPTR1** Integral univariate polynomial translation by 1.
- IUPVAR** Integral univariate polynomial variations.
- IUPVOI** Integral univariate polynomial, variations for open interval.
- IUPVSI** Integral univariate polynomial, variations for standard interval.
- IUPWRITE** Integral univariate polynomial write.
- IUSFPF** Integral univariate squarefree polynomial factorization.
- MAIPDE** Matrix of integral polynomials determinant, exact division algorithm.
- MAIPDM** Matrix of integral polynomials determinant, modular algorithm.
- MAIPHM** Matrix of integral polynomials homomorphism.
- MAIPP** Matrix of integral polynomials product.
- MIPDIF** Modular integral polynomial difference.
- MIPFSM** Modular integral polynomial from symmetric modular.
- MIPHOM** Modular integral polynomial homomorphism.
- MIPIPR** Modular integral polynomial mod ideal product.
- MIPISE** Modular integral polynomial mod ideal, solution of equation.
- MIPNEG** Modular integral polynomial negation.
- MIPPR** Modular integral polynomial product.
- MIPRAN** Modular integral polynomial, random.
- MIPSUM** Modular integral polynomial sum.
- MIUPQR** Modular integral univariate polynomial quotient and remainder.
- MIUPSE** Modular integral univariate polynomial, solution of equation.
- RPFIP** Rational polynomial from integral polynomial.
- RPMAIP** Rational polynomial monic associate of integral polynomial.
- SMFMIP** Symmetric modular from modular integral polynomial.

#### integration

- AFPINT** Algebraic number field polynomial integration.
- IPINT** Integral polynomial integration.
- RPIMV** Rational polynomial integration, main variable.

## interpolation

**MPINT** Modular polynomial interpolation.

## intersection

**CSINT** Characteristic set intersection.

**SINTER** Set intersection.

**USINT** Unordered set intersection.

## interval

**AFUPIIR** Algebraic number field polynomial isolating interval refinement.

**AMSIGNIR** Algebraic module sign, interval refinement.

**AMUPIIR** Algebraic module polynomial isolating interval refinement.

**AMUPVARIR** Algebraic module univariate polynomial variations, interval refinement.

**ANIPE** Algebraic number isolating interval for a primitive element.

**IIC** Isolating interval conversion.

**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.

**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.

**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.

**IPSIFI** Integral polynomial standard isolating interval from isolating interval.

**IPSIFI** Integral polynomial standard isolating interval from isolating interval.

**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

**ISFPPIR** Integral squarefree polynomial isolating interval refinement.

**IUPIIR** Integral univariate polynomial isolating interval refinement.

**IUPVOI** Integral univariate polynomial, variations for open interval.

**IUPVSI** Integral univariate polynomial, variations for standard interval.

**RIB** Rational interval bisection.

**RIL** Rational interval length.

**RILC** Rational interval length comparison.

**RINEG** Rational interval negation.

**RINT** Rational interval normalizing transformation.

**RIPROD** Rational interval product.

**RIRNP** Rational interval rational number product.

**RISIGN** Rational interval sign.

**RISUM** Rational interval sum.

**SFIFI** Single-precision floating-point interval from integer.

## intervals

**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**IPIIWS** Integral polynomial isolating intervals weakly disjoint to strongly disjoint.

**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.

## introduction

**PINV** Polynomial introduction of new variables.

**inverse**

**AFICR** Algebraic number field element inverse convert representation.

**AFINV** Algebraic number field element inverse.

**AFPICR** Algebraic number field polynomial inverse convert representation.

**CINV** Constructive inverse.

**INV** Inverse.

**MDINV** Modular digit inverse.

**MIINV** Modular integer inverse.

**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.

**RNINV** Rational number inverse.

**isolating**

**AFUPIIR** Algebraic number field polynomial isolating interval refinement.

**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPIIR** Algebraic module polynomial isolating interval refinement.

**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**ANIPE** Algebraic number isolating interval for a primitive element.

**IIC** Isolating interval conversion.

**IPIIWS** Integral polynomial isolating intervals weakly disjoint to strongly disjoint.

**IPSIFI** Integral polynomial standard isolating interval from isolating interval.

**IPSI** Integral polynomial standard isolating interval from isolating interval.

**ISFPIR** Integral squarefree polynomial isolating interval refinement.

**IUPIIR** Integral univariate polynomial isolating interval refinement.

**isolation**

**AFPBRI** Algebraic number field polynomial basis real root isolation.

**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.

**AFPRII** Algebraic number field polynomial real root isolation induction.

**AFPRRI** Algebraic number field polynomial relative real root isolation.

**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.

**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.

**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.

**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.

**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.

**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.

**IPLRRI** Integral polynomial list real root isolation.

**IPRICL** Integral polynomial real root isolation, Collins-Loos algorithm.  
**IPRIM** Integral polynomial real root isolation, modified Uspensky method.  
**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.  
**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.  
**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.  
**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.  
**IPRRII** Integral polynomial real root isolation induction.  
**IPRRRI** Integral polynomial relative real root isolation.  
**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.  
**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

**iupqs**

**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
 Integral univariate polynomial quotient substitution.

**kannan**

**LDSMKB** Linear diophantine system solution, modified Kannan and Bachem algorithm.

**karatsuba**

**IPRODK** Integer product, karatsuba algorithm.

**large**

**ILPDS** Integer large prime divisor search.

**last**

**LASTCELL** Last cell.

**leading**

**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.  
**IPBHTLV** Integral polynomial binary homothetic transformation, leading variable.  
**IPTR1LV** Integral polynomial translation by one, leading variable.  
**IPTRLV** Integral polynomial translation, leading variable.  
**PLBCF** Polynomial leading base coefficient.  
**PLDCF** Polynomial leading coefficient.

**least**

**ILCM** Integer least common multiple.  
**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.

**lemma**

**IPIQH** Integral polynomial mod ideal quadratic hensel lemma.  
**IUPQH** Integral univariate polynomial quadratic hensel lemma.  
**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
 Integral univariate polynomial quotient substitution.  
**MPIQH** Modular polynomial mod ideal, quadratic Hensel lemma.  
**MPIQHL** Modular polynomial mod ideal quadratic hensel lemma, list.  
**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single variable.

**length**

**IDIPR2** Integer digit inner product, length 2.  
**LENGTH** Length.  
**RIL** Rational interval length.  
**RILC** Rational interval length comparison.

**letter**  
**LETTER** Letter.

**lexicographically**  
**CPLEXN** Cartesian product, lexicographically next.  
**LEXNEX** Lexicographically next.

**line**  
**ARGSACLIB** Process the command line arguments.  
**FILINE** Flush the input stream line.

**linear**  
**AFUPRL** Algebraic number field univariate polynomial, root of a linear polynomial.  
**ILCOMB** Integer linear combination.  
**IUPRLP** Integral univariate polynomial, root of a linear polynomial.  
**LDSMKB** Linear diophantine system solution, modified Kannan and Bachem algorithm.  
**LDSSBR** Linear diophantine system solution, based on Rosser ideas.  
**VILCOM** Vector of integers linear combination.

**list**  
**AFPRLS** Algebraic number field polynomial real root list separation.  
**AFUPRLS** Algebraic number field univariate polynomial real root list separation.  
**AMUPRLS** Algebraic module univariate polynomial real root list separation.  
**CLOUT** Character list out.  
**FRESL** Fermat residue list.  
**FRLSM** Fermat residue list, single modulus.  
**ILWRITE** Integer list write.  
**IPFLC** Integral polynomial factor list combine.  
**IPLCPP** Integral polynomial list of contents and primitive parts.  
**IPLRRI** Integral polynomial list real root isolation.  
**IPRRLS** Integral polynomial real root list separation.  
**ISLIST** Test for non-empty list.  
**ISNIL** Test for empty list.  
**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
 Integral univariate polynomial quotient substitution.  
**LBIBMS** List of BETA-integers bubble-merge sort.  
**LBIBS** List of BETA-integers bubble sort.  
**LBIM** List of BETA-integers merge.  
**LCONC** List concatenation.  
**LEINST** List element insertion.  
**LELTI** List element.  
**LEROT** List element rotation.  
**LFS** List from String.  
**LINS** List insertion.  
**LINSRT** List insertion.  
**LIST1** List, 1 element.  
**LIST10** List, 10 elements.

**LIST2** List, 2 elements.  
**LIST3** List, 3 elements.  
**LIST4** List, 4 elements.  
**LIST5** List, 5 elements.  
**LMERGE** List merge.  
**LPERM** List permute.  
**LREAD** List read.  
**LSRCH** List search.  
**LWRITE** List write.  
**MDLCRA** Modular digit list chinese remainder algorithm.  
**MPIQHL** Modular polynomial mod ideal quadratic hensel lemma, list.  
**PCL** Polynomial coefficient list.  
**SLELTI** Set list element.  
**VLREAD** Variable list read.  
**VLSRCH** Variable list search.  
**VLWRITE** Variable list write.

**location**

**DIELOC** Display Input Error Location.

**logarithm**

**DLOG2** Digit logarithm, base 2.  
**IFCL2** Integer, floor and ceiling, logarithm, base 2.  
**ILOG2** Integer logarithm, base 2.  
**RNFCL2** Rational number floor and ceiling of logarithm, base 2.

**lookahead**

**LKAHEAD** Character lookahead.

**loos**

**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.  
**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.  
**IPRICL** Integral polynomial real root isolation, Collins-Loos algorithm.

**lower**

**SFRLS** Single-precision floating-point real number lower sum.

**lowest**

**RNRED** Rational number reduction to lowest terms.

**main**

**AFPCMV** Algebraic number field polynomial composition in main variable.  
**AFPDMV** Algebraic number field polynomial derivative, main variable.  
**AFPEMV** Algebraic number field polynomial evaluation of main variable.  
**AMPDMV** Algebraic module polynomial derivative, main variable.  
**IPBHTMV** Integral polynomial binary homothetic transformation, main variable.  
**IPDMV** Integral polynomial derivative, main variable.  
**IPEMV** Integral polynomial evaluation of main variable.  
**IPHDMV** Integral polynomial higher derivative, main variable.  
**IPSMV** Integral polynomial substitution for main variable.  
**IPTRMV** Integral polynomial translation, main variable.  
**main** Default main routine.  
**MCPMV** Matrix of coefficients of polynomials, with respect to main variable.  
**MPEMV** Modular polynomial evaluation of main variable.



**PMPMV** Polynomial multiplication by power of main variable.  
**PTMV** Polynomial transpose main variables. **PTV** Polynomial transpose variables.  
**RPDMV** Rational polynomial derivative, main variable.  
**RPEMV** Rational polynomial evaluation, main variable.  
**RPIMV** Rational polynomial integration, main variable.  
**mark**  
**MARK** Mark.  
**matrix**  
**MAIPDE** Matrix of integral polynomials determinant, exact division algorithm.  
**MAIPDM** Matrix of integral polynomials determinant, modular algorithm.  
**MAIPHM** Matrix of integral polynomials homomorphism.  
**MAIPP** Matrix of integral polynomials product.  
**MCPMV** Matrix of coefficients of polynomials, with respect to main variable.  
**MIAIM** Matrix of integers, adjoin identity matrix.  
**MIAIM** Matrix of integers, adjoin identity matrix.  
**MICINS** Matrix of integers column insertion.  
**MICS** Matrix of integers column sort.  
**MINNCT** Matrix of integers, non-negative column transformation.  
**MMDDET** Matrix of modular digits determinant.  
**MMDNSB** Matrix of modular digits null-space basis.  
**MMPDMA** Matrix of modular polynomials determinant, modular algorithm.  
**MMPEV** Matrix of modular polynomials evaluation.  
**max**  
**RNMAX** Rational number max.  
**maximum**  
**IMAX** Integer maximum.  
**IPMAXN** Integral polynomial maximum norm.  
**MAX** Maximum.  
**VMAX** Vector maximum.  
**medium**  
**IMPDS** Integer medium prime divisor search.  
**membership**  
**MEMBER** Membership test.  
**memory**  
**GCAFREE** Garbage collected array memory deallocation.  
**GCAMALLOC** Garbage collected array memory allocation.  
**merge**  
**LBIBMS** List of BETA-integers bubble-merge sort.  
**LBIM** List of BETA-integers merge.  
**LMERGE** List merge.  
**method**  
**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.  
**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.  
**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.  
**AMUPRINCS** Algebraic module univariate polynomial root isolation, nor-

malized coefficient sign variation method.

**IPRCNP** Integral polynomial real root calculation, Newton method preparation.

**IPRIM** Integral polynomial real root isolation, modified Uspensky method.

**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.

**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.

**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.

**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.

**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.

**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

#### min

**RNMIN** Rational number min.

#### minimal

**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.

**AMUPMPR** Algebraic module univariate polynomial minimal polynomial of a real root.

#### minimum

**IMIN** Integer minimum.

**MIN** Minimum.

**VMIN** Vector minimum.

#### minus

**ACLOCK** Clock minus garbage collection time.

#### mod

**IPIHOM** Integral polynomial mod ideal homomorphism.

**IPIPR** Integral polynomial mod ideal product.

**IPIQH** Integral polynomial mod ideal quadratic hensel lemma.

**MIPIPR** Modular integral polynomial mod ideal product.

**MPISE** Modular integral polynomial mod ideal, solution of equation.

**MMPIQR** Modular monic polynomial mod ideal quotient and remainder.

**MPIQH** Modular polynomial mod ideal, quadratic Hensel lemma.

**MPIQHL** Modular polynomial mod ideal quadratic hensel lemma, list.

**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single variable.

#### modified

**IPRIM** Integral polynomial real root isolation, modified Uspensky method.

**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.

**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.

**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.

**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.

**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.

**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

**LDSMKB** Linear diophantine system solution, modified Kannan and Bachem algorithm.

**PMDEG** Polynomial modified degree.

**modular**

**DMPPRD** Dense modular polynomial product.

**DMPSUM** Dense modular polynomial sum.

**DMUPNR** Dense modular univariate polynomial natural remainder.

**MAIPDM** Matrix of integral polynomials determinant, modular algorithm.

**MDCRA** Modular digit chinese remainder algorithm.

**MDDIF** Modular digit difference.

**MDEXP** Modular digit exponentiation.

**MDHOM** Modular digit homomorphism.

**MDINV** Modular digit inverse.

**MDLCRA** Modular digit list chinese remainder algorithm.

**MDNEG** Modular digit negative.

**MDPROD** Modular digit product.

**MDQ** Modular digit quotient.

**MDRAN** Modular digit, random.

**MDSUM** Modular digit sum.

**MIDCRA** Modular integer digit chinese remainder algorithm.

**MIDIF** Modular integer difference.

**MIEXP** Modular integer exponentiation.

**MIHOM** Modular integer homomorphism.

**MIINV** Modular integer inverse.

**MINEG** Modular integer negation.

**MIPDIF** Modular integral polynomial difference.

**MIPFSM** Modular integral polynomial from symmetric modular.

**MIPFSM** Modular integral polynomial from symmetric modular.

**MIPHOM** Modular integral polynomial homomorphism.

**MIPIPR** Modular integral polynomial mod ideal product.

**MIPISE** Modular integral polynomial mod ideal, solution of equation.

**MIPNEG** Modular integral polynomial negation.

**MIPPR** Modular integral polynomial product.

**MIPRAN** Modular integral polynomial, random.

**MIPROD** Modular integer product.

**MIPSUM** Modular integral polynomial sum.

**MIQ** Modular integer quotient.

**MIRAN** Modular integer, random.

**MISUM** Modular integer sum.

**MIUPQR** Modular integral univariate polynomial quotient and remainder.

**MIUPSE** Modular integral univariate polynomial, solution of equation.

**MMDET** Matrix of modular digits determinant.

**MMDNSB** Matrix of modular digits null-space basis.

**MMPDMA** Matrix of modular polynomials determinant, modular algorithm.

**MMPDMA** Matrix of modular polynomials determinant, modular algorithm.

**MMPEV** Matrix of modular polynomials evaluation.

**MMPIQR** Modular monic polynomial mod ideal quotient and remainder.

**MPDIF** Modular polynomial difference.

**MPEMV** Modular polynomial evaluation of main variable.  
**MPEVAL** Modular polynomial evaluation.  
**MPEXP** Modular polynomial exponentiation.  
**MPGCD** Modular polynomial greatest common divisor and cofactors.  
**MPHOM** Modular polynomial homomorphism.  
**MPINT** Modular polynomial interpolation.  
**MPIQH** Modular polynomial mod ideal, quadratic Hensel lemma.  
**MPIQHL** Modular polynomial mod ideal quadratic Hensel lemma, list.  
**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single variable.  
**MPMDP** Modular polynomial modular digit product.  
**MPMDP** Modular polynomial modular digit product.  
**MPMON** Modular polynomial monic.  
**MPNEG** Modular polynomial negative.  
**MPPROD** Modular polynomial product.  
**MPPSR** Modular polynomial pseudo-remainder.  
**MPQ** Modular polynomial quotient.  
**MPQR** Modular polynomial quotient and remainder.  
**MPRAN** Modular polynomial, random.  
**MPRES** Modular polynomial resultant.  
**MPSPRS** Modular polynomial subresultant polynomial remainder sequence.  
**MPSUM** Modular polynomial sum.  
**MPUC** Modular polynomial univariate content.  
**MPUCPP** Modular polynomial univariate content and primitive part.  
**MPUCS** Modular polynomial univariate content subroutine.  
**MPUP** Modular polynomial univariate product.  
**MPUPP** Modular polynomial univariate primitive part.  
**MPUQ** Modular polynomial univariate quotient.  
**MUPBQP** Modular univariate polynomial berlekamp Q polynomials construction.  
**MUPDDF** Modular univariate polynomial distinct degree factorization.  
**MUPDER** Modular univariate polynomial derivative.  
**MUPEGC** Modular univariate polynomial extended greatest common divisor.  
**MUPFBL** Modular univariate polynomial factorization-berlekamp algorithm.  
**MUPFS** Modular univariate polynomial factorization, special.  
**MUPGCD** Modular univariate polynomial greatest common divisor.  
**MUPHEG** Modular univariate polynomial half-extended greatest common divisor.  
**MUPRAN** Modular univariate polynomial, random.  
**MUPRC** Modular univariate polynomial resultant and cofactor.  
**MUPRES** Modular univariate polynomial resultant.  
**MUPSFF** Modular univariate polynomial squarefree factorization.  
**SMFMI** Symmetric modular from modular integer.  
**SMFMI** Symmetric modular from modular integer.  
**SMFMIP** Symmetric modular from modular integral polynomial.  
**SMFMIP** Symmetric modular from modular integral polynomial.  
**VMPIP** Vector of modular polynomial inner product.

#### module

**AMPDMV** Algebraic module polynomial derivative, main variable.  
**AMPSAFP** Algebraic module polynomial similar to algebraic field polyno-

mial.

**AMSIGN** Algebraic module sign.

**AMSIGNIR** Algebraic module sign, interval refinement.

**AMUPBES** Algebraic module univariate polynomial, binary rational evaluation of sign.

**AMUPBHT** Algebraic module univariate polynomial binary homothetic transformation.

**AMUPIIR** Algebraic module polynomial isolating interval refinement.

**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPMPR** Algebraic module univariate polynomial minimal polynomial of a real root.

**AMUPNT** Algebraic module univariate polynomial negative transformation.

**AMUPRBH** Algebraic module univariate polynomial root bound and homothetic transformation.

**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.

**AMUPRLS** Algebraic module univariate polynomial real root list separation.

**AMUPRRS** Algebraic module univariate polynomial real root separation.

**AMUPSR** Algebraic module univariate polynomial, sign at a rational point.

**AMUPTR** Algebraic module univariate polynomial translation.

**AMUPTR1** Algebraic module univariate polynomial translation by 1.

**AMUPVARIR** Algebraic module univariate polynomial variations, interval refinement.

#### modulus

**FRLSM** Fermat residue list, single modulus.

**SFCMSQ** Single-precision floating-point complex modulus squared.

#### monic

**AFPMON** Algebraic number field polynomial monic.

**MMPIQR** Modular monic polynomial mod ideal quotient and remainder.

**MPMON** Modular polynomial monic.

**RPMAIP** Rational polynomial monic associate of integral polynomial.

#### monomial

**PMON** Polynomial monomial.

#### multiple

**AFPME** Algebraic number field polynomial multiple evaluation.

**ILCM** Integer least common multiple.

**IPAFME** Integral polynomial, algebraic number field multiple evaluation.

**RPAFME** Rational polynomial, algebraic number field multiple evaluation.

**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.

#### multiplication

**IMP2** Integer multiplication by power of 2.

**PMPMV** Polynomial multiplication by power of main variable.

#### natural

**DMUPNR** Dense modular univariate polynomial natural remainder.

**negation**

**INEG** Integer negation.  
**MINEG** Modular integer negation.  
**MIPNEG** Modular integral polynomial negation.  
**RINEG** Rational interval negation.  
**SFCNEG** Single-precision floating-point complex negation.  
**SFRNEG** Single-precision floating-point real negation.  
**VINEG** Vector of integers negation.

**negative**

**AFNEG** Algebraic number field negative.  
**AFPNEG** Algebraic number field polynomial negative.  
**AMUPNT** Algebraic module univariate polynomial negative transformation.  
**DRANN** Digit, random non-negative.  
**IPNEG** Integral polynomial negative.  
**IPNT** Integral polynomial negative transformation.  
**IUPNT** Integral univariate polynomial negative transformation.  
**MDNEG** Modular digit negative.  
**MINNCT** Matrix of integers, non-negative column transformation.  
**MPNEG** Modular polynomial negative.  
**RNNEG** Rational number negative.  
**RPNEG** Rational polynomial negative.

**new**

**PINV** Polynomial introduction of new variables.

**newton**

**IPRCNP** Integral polynomial real root calculation, Newton method preparation.

**next**

**CPLEXN** Cartesian product, lexicographically next.  
**LEXNEX** Lexicographically next.  
**PARTN** Partition, next.

**non**

**DNIMP** Digit non-implication.  
**DRANN** Digit, random non-negative.  
**ISLIST** Test for non-empty list.  
**MINNCT** Matrix of integers, non-negative column transformation.

**norm**

**AFPNORM** Algebraic number field polynomial norm.  
**AFUPSFN** Algebraic number field univariate polynomial squarefree norm.  
**IPMAXN** Integral polynomial maximum norm.  
**IPSUMN** Integral polynomial sum norm.

**normalize**

**AFPNIP** Algebraic number field polynomial normalize to integral polynomial.

**normalized**

**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.

**normalizing**

**RINT** Rational interval normalizing transformation.

**not**

**DNOT** Digit not.

**null**

**MMDNSB** Matrix of modular digits null-space basis.

**number**

**AFCOMP** Algebraic number field comparison.

**AFCR** Algebraic number field element convert representation.

**AFDIF** Algebraic number field element difference.

**AFDWRITE** Algebraic number field, decimal write.

**AFFINT** Algebraic number field element from integer.

**AFFRN** Algebraic number field element from rational number.

**AFFRN** Algebraic number field element from rational number.

**AFICR** Algebraic number field element inverse convert representation.

**AFINV** Algebraic number field element inverse.

**AFNEG** Algebraic number field negative.

**AFPAFP** Algebraic number field polynomial algebraic number field element product.

**AFPAFP** Algebraic number field polynomial algebraic number field element product.

**AFPAFQ** Algebraic number field polynomial algebraic number field element quotient.

**AFPAFQ** Algebraic number field polynomial algebraic number field element quotient.

**AFPBRI** Algebraic number field polynomial basis real root isolation.

**AFPCMV** Algebraic number field polynomial composition in main variable.

**AFPCR** Algebraic number field polynomial convert representation.

**AFPDIF** Algebraic number field polynomial difference.

**AFPDMV** Algebraic number field polynomial derivative, main variable.

**AFPEMV** Algebraic number field polynomial evaluation of main variable.

**AFPEV** Algebraic number field polynomial evaluation.

**AFPFIP** Algebraic number field polynomial from integral polynomial.

**AFPPRP** Algebraic number field polynomial from rational polynomial.

**AFPICR** Algebraic number field polynomial inverse convert representation.

**AFPINT** Algebraic number field polynomial integration.

**AFPME** Algebraic number field polynomial multiple evaluation.

**AFPMON** Algebraic number field polynomial monic.

**AFPNEG** Algebraic number field polynomial negative.

**AFPNI** Algebraic number field polynomial normalize to integral polynomial.

**AFPNO** Algebraic number field polynomial norm.

**AFPPR** Algebraic number field polynomial product.

**AFPQR** Algebraic number field polynomial quotient and remainder.

**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.

**AFPRII** Algebraic number field polynomial real root isolation induction.

**AFPRLS** Algebraic number field polynomial real root list separation.

**AFPROD** Algebraic number field element product.

**AFPRRI** Algebraic number field polynomial relative real root isolation.

**AFPRRS** Algebraic number field polynomial real root separation.

**AFPSUM** Algebraic number field polynomial sum.

**AFPWRITE** Algebraic number field polynomial write.

**AFQ** Algebraic number field quotient.

**AFSIGN** Algebraic number field sign.

**AFSUM** Algebraic number field element sum.

**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.  
**AFUPEAC** Algebraic number field univariate polynomial factorization.  
**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.  
**AFUPGS** Algebraic number field polynomial greatest squarefree divisor.  
**AFUPIIR** Algebraic number field polynomial isolating interval refinement.  
**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.  
**AFUPRB** Algebraic number field univariate polynomial root bound.  
**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.  
**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.  
**AFUPRL** Algebraic number field univariate polynomial, root of a linear polynomial.  
**AFUPRLS** Algebraic number field univariate polynomial real root list separation.  
**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.  
**AFUPRRS** Algebraic number field univariate polynomial real root separation.  
**AFUPSF** Algebraic number field univariate polynomial squarefree factorization.  
**AFUPSFN** Algebraic number field univariate polynomial squarefree norm.  
**AFUPSR** Algebraic number field univariate polynomial, sign at a rational point.  
**AFUPVAR** Algebraic number field univariate polynomial variations.  
**AFUPWRITE** Algebraic number field univariate polynomial write.  
**AIFAN** Algebraic integer from algebraic number.  
**ANDWRITE** Algebraic number decimal write.  
**ANFAF** Algebraic number from algebraic number field element.  
**ANFAF** Algebraic number from algebraic number field element.  
**ANIPE** Algebraic number isolating interval for a primitive element.  
**ANPEDE** [Algebraic number primitive element for a double extension.  
**ANPROD** Algebraic number product.  
**ANREPE** Algebraic number represent element of a primitive extension.  
**ANSUM** Algebraic number sum.  
**IPAFME** Integral polynomial, algebraic number field multiple evaluation.  
**RIRNP** Rational interval rational number product.  
**RNABS** Rational number absolute value.  
**RNBCR** Rational number binary common representation.  
**RNCEIL** Rational number, ceiling of.  
**RNCOMP** Rational number comparison.  
**RNDEN** Rational number denominator.  
**RNDIF** Rational number difference.  
**RNDWRITE** Rational number decimal write.  
**RNFCL2** Rational number floor and ceiling of logarithm, base 2.  
**RNFLOP** Rational number, floor of.



**RNINT** Rational number from integer.  
**RNINV** Rational number inverse.  
**RNMAX** Rational number max.  
**RNMIN** Rational number min.  
**RNNEG** Rational number negative.  
**RNNUM** Rational number numerator.  
**RNP2** Rational number power of 2.  
**RNPROD** Rational number product.  
**RNQ** Rational number quotient.  
**RNRAND** Rational number, random.  
**RNREAD** Rational number read.  
**RNRED** Rational number reduction to lowest terms.  
**RNSIGN** Rational number sign.  
**RNSUM** Rational number sum.  
**RNWRITE** Rational number write.  
**RPAFME** Rational polynomial, algebraic number field multiple evaluation.  
**RPRNP** Rational polynomial rational number product.  
**SFRLS** Single-precision floating-point real number lower sum.

**numerator**

**RNNUM** Rational number numerator.

**object**

**ISOBJECT** Test for object.  
**OREAD** Object read.  
**OWRITE** Object write.

**odd**

**IODD** Integer odd.  
**ODD** Odd.

**one**

**IPONE** Integral polynomial one.  
**IPTR1** Integral polynomial translation by one, specified variable.  
**IPTR1LV** Integral polynomial translation by one, leading variable.

**open**

**IPRIMO** Integral polynomial real root isolation, modified Uspensky method,  
     open interval.  
**IUPVOI** Integral univariate polynomial, variations for open interval.

**or**

**DOR** Digit or.

**order**

**IORD2** Integer, order of 2.  
**ORDER** Order.  
**PDBORD** Polynomial divided by order.  
**PORD** Polynomial order.

**out**

**CLOUT** Character list out.  
**INFOSACLIB** Write out usage information for SACLIB.

**output**

**IUPBEI** Integral univariate polynomial binary rational evaluation, integer out-  
     put.

**pair**

**PAIR** Pair.

**part**

**IPCPP** Integral polynomial content and primitive part.  
**IPICPP** Integral polynomial integer content and primitive part.  
**IPIP** Integral polynomial integer primitive part.  
**IPPP** Integral polynomial primitive part.  
**IPSCPP** Integral polynomial sign, content, and primitive part.  
**MPUCPP** Modular polynomial univariate content and primitive part.  
**MPUPP** Modular polynomial univariate primitive part.  
**SFCIP** Single-precision floating-point complex, imaginary part.  
**SFCRP** Single-precision floating-point complex, real part.

**partial**

**DPCC** Digit partial cosequence calculation.  
**IBCPS** Integer binomial coefficient partial sum.

**partition**

**CSFPAR** Characteristic set from partition.  
**PARTN** Partition, next.  
**PARTR** Partition, random.  
**PARTSS** Partition sumset.

**parts**

**IPLCPP** Integral polynomial list of contents and primitive parts.

**pcpv**

**PCONST** Polynomial constant. **PCPV** Polynomial cyclic permutation of variables.

**permutation**

**PCONST** Polynomial constant. **PCPV** Polynomial cyclic permutation of variables.  
**PERMCY** Permutation, cyclic.  
**PERMR** Permutation, random.  
**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.  
**PPERMV** Polynomial permutation of variables.

**permute**

**LPERM** List permute.

**picpv**

**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.

**plane**

**IPVCHT** Integral polynomial variations after circle to half-plane transformation.  
**IUPCHT** Integral univariate polynomial circle to half-plane transformation.

**point**

**AFUPSR** Algebraic number field univariate polynomial, sign at a rational point.  
**AMUPSR** Algebraic module univariate polynomial, sign at a rational point.  
**GC** Garbage collection entry-point.  
**SFCCON** Single-precision floating-point complex conjugation.  
**SFCDIF** Single-precision floating-point complex difference.  
**SFCFR** Single-precision floating-point complex from real.  
**SFCIP** Single-precision floating-point complex, imaginary part.  
**SFCMSQ** Single-precision floating-point complex modulus squared.

**SFCNEG** Single-precision floating-point complex negation.  
**SFCPR** Single-precision floating-point complex product.  
**SFCQ** Single-precision floating-point complex quotient.  
**SFCRP** Single-precision floating-point complex, real part.  
**SFCSUM** Single-precision floating-point complex sum.  
**SFIFI** Single-precision floating-point interval from integer.  
**SFRABS** Single-precision floating-point real absolute value.  
**SFRDIF** Single-precision floating-point real difference.  
**SFRLS** Single-precision floating-point real number lower sum.  
**SFRNEG** Single-precision floating-point real negation.  
**SFRPR** Single-precision floating-point real product.  
**SFRQ** Single-precision floating-point real quotient.  
**SFRSUM** Single-precision floating-point real sum.

**pointer**

**GCA2PTR** Convert garbage collected array handle to C pointer.

**points**

**IPCEVP** Integral polynomial, choice of evaluation points.

**polynomial**

**AFPAFP** Algebraic number field polynomial algebraic number field element product.  
**AFPAFQ** Algebraic number field polynomial algebraic number field element quotient.  
**AFPBRI** Algebraic number field polynomial basis real root isolation.  
**AFPCMV** Algebraic number field polynomial composition in main variable.  
**AFPCR** Algebraic number field polynomial convert representation.  
**AFPDIF** Algebraic number field polynomial difference.  
**AFPDMV** Algebraic number field polynomial derivative, main variable.  
**AFPEMV** Algebraic number field polynomial evaluation of main variable.  
**AFPEV** Algebraic number field polynomial evaluation.  
**AFPFIP** Algebraic number field polynomial from integral polynomial.  
**AFPFIP** Algebraic number field polynomial from integral polynomial.  
**AFPFRR** Algebraic number field polynomial from rational polynomial.  
**AFPFRR** Algebraic number field polynomial from rational polynomial.  
**AFPICR** Algebraic number field polynomial inverse convert representation.  
**AFPINT** Algebraic number field polynomial integration.  
**AFPME** Algebraic number field polynomial multiple evaluation.  
**AFPMON** Algebraic number field polynomial monic.  
**AFPNEG** Algebraic number field polynomial negative.  
**AFPNIIP** Algebraic number field polynomial normalize to integral polynomial.  
**AFPNIIP** Algebraic number field polynomial normalize to integral polynomial.  
**AFPNNORM** Algebraic number field polynomial norm.  
**AFPPR** Algebraic number field polynomial product.  
**AFPQR** Algebraic number field polynomial quotient and remainder.  
**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.  
**AFPRII** Algebraic number field polynomial real root isolation induction.  
**AFPRLS** Algebraic number field polynomial real root list separation.  
**AFPRRI** Algebraic number field polynomial relative real root isolation.  
**AFPRRS** Algebraic number field polynomial real root separation.  
**AFPSUM** Algebraic number field polynomial sum.

**AFPWRITE** Algebraic number field polynomial write.  
**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.  
**AFUPFAC** Algebraic number field univariate polynomial factorization.  
**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.  
**AFUPGS** Algebraic number field polynomial greatest squarefree divisor.  
**AFUPIIR** Algebraic number field polynomial isolating interval refinement.  
**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.  
**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.  
**AFUPRB** Algebraic number field univariate polynomial root bound.  
**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.  
**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.  
**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.  
**AFUPRL** Algebraic number field univariate polynomial, root of a linear polynomial.  
**AFUPRL** Algebraic number field univariate polynomial, root of a linear polynomial.  
**AFUPRLS** Algebraic number field univariate polynomial real root list separation.  
**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.  
**AFUPRRS** Algebraic number field univariate polynomial real root separation.  
**AFUPSF** Algebraic number field univariate polynomial squarefree factorization.  
**AFUPSFN** Algebraic number field univariate polynomial squarefree norm.  
**AFUPSR** Algebraic number field univariate polynomial, sign at a rational point.  
**AFUPVAR** Algebraic number field univariate polynomial variations.  
**AFUPWRITE** Algebraic number field univariate polynomial write.  
**AMPDMV** Algebraic module polynomial derivative, main variable.  
**AMPSAFP** Algebraic module polynomial similar to algebraic field polynomial.  
**AMPSAFP** Algebraic module polynomial similar to algebraic field polynomial.  
**AMUPBES** Algebraic module univariate polynomial, binary rational evaluation of sign.  
**AMUPBHT** Algebraic module univariate polynomial binary homothetic transformation.  
**AMUPIIR** Algebraic module polynomial isolating interval refinement.  
**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.  
**AMUPMPR** Algebraic module univariate polynomial minimal polynomial of

a real root.

**AMUPMPR** Algebraic module univariate polynomial minimal polynomial of a real root.

**AMUPNT** Algebraic module univariate polynomial negative transformation.

**AMUPRBH** Algebraic module univariate polynomial root bound and homothetic transformation.

**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.

**AMUPRLS** Algebraic module univariate polynomial real root list separation.

**AMUPRRS** Algebraic module univariate polynomial real root separation.

**AMUPSR** Algebraic module univariate polynomial, sign at a rational point.

**AMUPTR** Algebraic module univariate polynomial translation.

**AMUPTR1** Algebraic module univariate polynomial translation by 1.

**AMUPVARIR** Algebraic module univariate polynomial variations, interval refinement.

**DIIPREAD** Distributive integral polynomial read.

**DIIPWRITE** Distributive integral polynomial write.

**DIPDEG** Distributive polynomial degree.

**DIPFP** Distributive polynomial from polynomial.

**DIPFP** Distributive polynomial from polynomial.

**DIPINS** Distributive polynomial, insert term.

**DIRPREAD** Distributive rational polynomial read.

**DIRPWRITE** Distributive rational polynomial write.

**DMPPRD** Dense modular polynomial product.

**DMPSUM** Dense modular polynomial sum.

**DMUPNR** Dense modular univariate polynomial natural remainder.

**DPFP** Dense polynomial from polynomial.

**DPFP** Dense polynomial from polynomial.

**IPABS** Integral polynomial absolute value.

**IPAFME** Integral polynomial, algebraic number field multiple evaluation.

**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.

**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.

**IPBHT** Integral polynomial binary homothetic transformation.

**IPBHTLV** Integral polynomial binary homothetic transformation, leading variable.

**IPBHTMV** Integral polynomial binary homothetic transformation, main variable.

**IPBREI** Integral polynomial binary rational evaluation, integral polynomial result.

**IPBREI** Integral polynomial binary rational evaluation, integral polynomial result.

**IPC** Integral polynomial content.

**IPCEVP** Integral polynomial, choice of evaluation points.

**IPCONST** Integral polynomial constant.

**IPCPP** Integral polynomial content and primitive part.  
**IPCRA** Integral polynomial chinese remainder algorithm.  
**IPCSFB** Integral polynomial coarsest squarefree basis.  
**IPDER** Integral polynomial derivative.  
**IPDIF** Integral polynomial difference.  
**IPDMV** Integral polynomial derivative, main variable.  
**IPDSCR** Integral polynomial discriminant.  
**IPDWRITE** Integral Polynomial Distributive Write.  
**IPEMV** Integral polynomial evaluation of main variable.  
**IPEVAL** Integral polynomial evaluation.  
**IPEXP** Integral polynomial exponentiation.  
**IPEXPREAD** Integral polynomial expression read.  
**IPEXPREADR** Integral polynomial expression read, remove terminating character.  
**IPFAC** Integral polynomial factorization.  
**IPFACTREAD** Integral polynomial factor read.  
**IPFCB** Integral polynomial factor coefficient bound.  
**IPFLC** Integral polynomial factor list combine.  
**IPFRP** Integral polynomial from rational polynomial.  
**IPFRP** Integral polynomial from rational polynomial.  
**IPFSD** Integral polynomial factorization, second derivative.  
**IPFSFB** Integral polynomial finest squarefree basis.  
**IPGCD** Integral polynomial greatest common divisor and cofactors.  
**IPGFCB** Integral polynomial Gelfond factor coefficient bound.  
**IPGSUB** Integral polynomial general substitution.  
**IPHDMV** Integral polynomial higher derivative, main variable.  
**IPIC** Integral polynomial integer content.  
**IPICPP** Integral polynomial integer content and primitive part.  
**IPICS** Integral polynomial integer content subroutine.  
**IPIHOM** Integral polynomial mod ideal homomorphism.  
**IPIIWS** Integral polynomial isolating intervals weakly disjoint to strongly disjoint.  
**IPINT** Integral polynomial integration.  
**IPIP** Integral polynomial integer product.  
**IPIPP** Integral polynomial integer primitive part.  
**IPIPR** Integral polynomial mod ideal product.  
**IPIQ** Integral polynomial integer quotient.  
**IPIQH** Integral polynomial mod ideal quadratic hensel lemma.  
**IPLCPP** Integral polynomial list of contents and primitive parts.  
**IPLRRI** Integral polynomial list real root isolation.  
**IPMAXN** Integral polynomial maximum norm.  
**IPNEG** Integral polynomial negative.  
**IPNT** Integral polynomial negative transformation.  
**IPONE** Integral polynomial one.  
**IPP2P** Integral polynomial power of 2 product.  
**IPPGSD** Integral polynomial primitive greatest squarefree divisor.  
**IPPOWREAD** Integral polynomial power read.  
**IPPP** Integral polynomial primitive part.  
**IPPROD** Integral polynomial product.  
**IPPSC** Integral polynomial principal subresultant coefficients.

**IPPSR** Integral polynomial pseudo-remainder.  
**IPQ** Integral polynomial quotient.  
**IPQR** Integral polynomial quotient and remainder.  
**IPRAN** Integral polynomial, random.  
**IPRCH** Integral polynomial real root calculation, high precision.  
**IPRCHS** Integral polynomial real root calculation, high-precision special.  
**IPRCN1** Integral polynomial real root calculation, 1 root.  
**IPRCNP** Integral polynomial real root calculation, Newton method preparation.  
**IPREAD** Integral polynomial read.  
**IPRES** Integral polynomial resultant.  
**IPRICL** Integral polynomial real root isolation, Collins-Loos algorithm.  
**IPRIM** Integral polynomial real root isolation, modified Uspensky method.  
**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.  
**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.  
**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.  
**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.  
**IPRPRS** Integral polynomial reduced polynomial remainder sequence.  
**IPRPRS** Integral polynomial reduced polynomial remainder sequence.  
**IPRRII** Integral polynomial real root isolation induction.  
**IPRRLS** Integral polynomial real root list separation.  
**IPRRRI** Integral polynomial relative real root isolation.  
**IPRRS** Integral polynomial real root separation.  
**IPSCPP** Integral polynomial sign, content, and primitive part.  
**IPSF** Integral polynomial squarefree factorization.  
**IPSFBA** Integral polynomial squarefree basis augmentation.  
**IPSIFI** Integral polynomial standard isolating interval from isolating interval.  
**IPSIGN** Integral polynomial sign.  
**IPSMV** Integral polynomial substitution for main variable.  
**IPSPRS** Integral polynomial subresultant polynomial remainder sequence.  
**IPSPRS** Integral polynomial subresultant polynomial remainder sequence.  
**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.  
**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.  
**IPSRP** Integral polynomial similar to rational polynomial.  
**IPSRP** Integral polynomial similar to rational polynomial.  
**IPSUB** Integral polynomial substitution.  
**IPSUM** Integral polynomial sum.  
**IPSUMN** Integral polynomial sum norm.  
**IPTERMREAD** Integral polynomial term read.  
**IPTPR** Integral polynomial truncated product.  
**IPTR** Integral polynomial translation, specified variable.  
**IPTR1** Integral polynomial translation by one, specified variable.  
**IPTR1LV** Integral polynomial translation by one, leading variable.  
**IPTRAN** Integral polynomial translation.  
**IPTRLV** Integral polynomial translation, leading variable.

**IPTRMV** Integral polynomial translation, main variable.  
**IPTRUN** Integral polynomial truncation.  
**IPVCHT** Integral polynomial variations after circle to half-plane transformation.  
**IPWRITE** Integral polynomial write.  
**ISFPF** Integral squarefree polynomial factorization.  
**ISFPIR** Integral squarefree polynomial isolating interval refinement.  
**ISPSFB** Integral squarefree polynomial squarefree basis.  
**IUPBEI** Integral univariate polynomial binary rational evaluation, integer output.  
**IUPBES** Integral univariate polynomial binary rational evaluation of sign.  
**IUPBHT** Integral univariate polynomial binary homothetic transformation.  
**IUPBRE** Integral univariate polynomial binary rational evaluation.  
**IUPCHT** Integral univariate polynomial circle to half-plane transformation.  
**IUPFAC** Integral univariate polynomial factorization.  
**IUPFDS** Integral univariate polynomial factor degree set.  
**IUPIHT** Integral univariate polynomial integer homothetic transformation.  
**IUPIIR** Integral univariate polynomial isolating interval refinement.  
**IUPNT** Integral univariate polynomial negative transformation.  
**IUPQH** Integral univariate polynomial quadratic hensel lemma.  
**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
Integral univariate polynomial quotient substitution.  
**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
Integral univariate polynomial quotient substitution.  
**IUPRB** Integral univariate polynomial root bound.  
**IUPRC** Integral univariate polynomial resultant and cofactor.  
**IUPRLP** Integral univariate polynomial, root of a linear polynomial.  
**IUPRLP** Integral univariate polynomial, root of a linear polynomial.  
**IUPSR** Integral univariate polynomial semi-remainder.  
**IUPTPR** Integral univariate polynomial truncated product.  
**IUPTR** Integral univariate polynomial translation.  
**IUPTR1** Integral univariate polynomial translation by 1.  
**IUPVAR** Integral univariate polynomial variations.  
**IUPVOI** Integral univariate polynomial, variations for open interval.  
**IUPVSI** Integral univariate polynomial, variations for standard interval.  
**IUPWRITE** Integral univariate polynomial write.  
**IUSFPF** Integral univariate squarefree polynomial factorization.  
**MIPDIF** Modular integral polynomial difference.  
**MIPFSM** Modular integral polynomial from symmetric modular.  
**MIPHOM** Modular integral polynomial homomorphism.  
**MIPIPR** Modular integral polynomial mod ideal product.  
**MIPISE** Modular integral polynomial mod ideal, solution of equation.  
**MIPNEG** Modular integral polynomial negation.  
**MIPPR** Modular integral polynomial product.  
**MIPRAN** Modular integral polynomial, random.  
**MIPSUM** Modular integral polynomial sum.  
**MIUPQR** Modular integral univariate polynomial quotient and remainder.  
**MIUPSE** Modular integral univariate polynomial, solution of equation.  
**MMPIQR** Modular monic polynomial mod ideal quotient and remainder.  
**MPDIF** Modular polynomial difference.



**MPEMV** Modular polynomial evaluation of main variable.  
**MPEVAL** Modular polynomial evaluation.  
**MPEXP** Modular polynomial exponentiation.  
**MPGCDC** Modular polynomial greatest common divisor and cofactors.  
**MPHOM** Modular polynomial homomorphism.  
**MPINT** Modular polynomial interpolation.  
**MPIQH** Modular polynomial mod ideal, quadratic Hensel lemma.  
**MPIQHL** Modular polynomial mod ideal quadratic hensel lemma, list.  
**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single variable.  
**MPMDP** Modular polynomial modular digit product.  
**MPMON** Modular polynomial monic.  
**MPNEG** Modular polynomial negative.  
**MPPROD** Modular polynomial product.  
**MPPSR** Modular polynomial pseudo-remainder.  
**MPQ** Modular polynomial quotient.  
**MPQR** Modular polynomial quotient and remainder.  
**MPRAN** Modular polynomial, random.  
**MPRES** Modular polynomial resultant.  
**MPSPRS** Modular polynomial subresultant polynomial remainder sequence.  
**MPSPRS** Modular polynomial subresultant polynomial remainder sequence.  
**MPSUM** Modular polynomial sum.  
**MPUC** Modular polynomial univariate content.  
**MPUCPP** Modular polynomial univariate content and primitive part.  
**MPUCS** Modular polynomial univariate content subroutine.  
**MPUP** Modular polynomial univariate product.  
**MPUPP** Modular polynomial univariate primitive part.  
**MPUQ** Modular polynomial univariate quotient.  
**MUPBQP** Modular univariate polynomial berlekamp Q polynomials construction.  
**MUPDDF** Modular univariate polynomial distinct degree factorization.  
**MUPDER** Modular univariate polynomial derivative.  
**MUPEGC** Modular univariate polynomial extended greatest common divisor.  
**MUPFBL** Modular univariate polynomial factorization-berlekamp algorithm.  
**MUPFS** Modular univariate polynomial factorization, special.  
**MUPGCD** Modular univariate polynomial greatest common divisor.  
**MUPHEG** Modular univariate polynomial half-extended greatest common divisor.  
**MUPRAN** Modular univariate polynomial, random.  
**MUPRC** Modular univariate polynomial resultant and cofactor.  
**MUPRES** Modular univariate polynomial resultant.  
**MUPSFF** Modular univariate polynomial squarefree factorization.  
**PBIN** Polynomial binomial.  
**PCL** Polynomial coefficient list.  
**PCONST** Polynomial constant. PCPV Polynomial cyclic permutation of variables.  
**PCONST** Polynomial constant. PCPV Polynomial cyclic permutation of variables.  
**PDBORD** Polynomial divided by order.  
**PDEG** Polynomial degree.

**PDEGSV** Polynomial degree, specified variable.  
**PDEGV** Polynomial degree vector.  
**PDPV** Polynomial division by power of variable.  
**PFBRE** Polynomial From Base Ring Element.  
**PFDIP** Polynomial from distributive polynomial.  
**PFDIP** Polynomial from distributive polynomial.  
**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.  
**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.  
**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.  
**PINV** Polynomial introduction of new variables.  
**PLBCF** Polynomial leading base coefficient.  
**PLDCF** Polynomial leading coefficient.  
**PMDEG** Polynomial modified degree.  
**PMON** Polynomial monomial.  
**PMPMV** Polynomial multiplication by power of main variable.  
**PORD** Polynomial order.  
**PERMV** Polynomial permutation of variables.  
**PRED** Polynomial reductum.  
**PRT** Polynomial reciprocal transformation.  
**PSDSV** Polynomial special decomposition, specified variable.  
**PTBCF** Polynomial trailing base coefficient.  
**PTMV** Polynomial transpose main variables. **PTV** Polynomial transpose variables.  
**PTMV** Polynomial transpose main variables. **PTV** Polynomial transpose variables.  
**PUFP** Polynomial, univariate, from polynomial.  
**PUFP** Polynomial, univariate, from polynomial.  
**PUNT** Polynomial univariate test.  
**RPAFME** Rational polynomial, algebraic number field multiple evaluation.  
**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.  
**RPDIF** Rational polynomial difference.  
**RPDMV** Rational polynomial derivative, main variable.  
**RPDWRITE** Rational Polynomial Distributive Write.  
**RPEMV** Rational polynomial evaluation, main variable.  
**RPEXPREAD** Rational polynomial expression read.  
**RPFACREAD** Rational polynomial factor read.  
**RPFIP** Rational polynomial from integral polynomial.  
**RPFIP** Rational polynomial from integral polynomial.  
**RPIMV** Rational polynomial integration, main variable.  
**RPMAIP** Rational polynomial monic associate of integral polynomial.  
**RPMAIP** Rational polynomial monic associate of integral polynomial.  
**RPNEG** Rational polynomial negative.  
**RPPOWREAD** Rational polynomial power read.  
**RPPROD** Rational polynomial product.  
**RPQR** Rational polynomial quotient and remainder.  
**RPREAD** Rational polynomial read.

**RPRNP** Rational polynomial rational number product.  
**RPSUM** Rational polynomial sum.  
**RPTERMREAD** Rational polynomial term read.  
**RPWRITE** Rational polynomial write.  
**RUPWRITE** Rational univariate polynomial write.  
**SMFMIP** Symmetric modular from modular integral polynomial.  
**VMPIP** Vector of modular polynomial inner product.

#### polynomials

**MAIPDE** Matrix of integral polynomials determinant, exact division algorithm.  
**MAIPDM** Matrix of integral polynomials determinant, modular algorithm.  
**MAIPHM** Matrix of integral polynomials homomorphism.  
**MAIPP** Matrix of integral polynomials product.  
**MCPMV** Matrix of coefficients of polynomials, with respect to main variable.  
**MMPDMA** Matrix of modular polynomials determinant, modular algorithm.  
**MMPEV** Matrix of modular polynomials evaluation.  
**MUPBQP** Modular univariate polynomial berlekamp Q polynomials construction.

#### power

**IDP2** Integer division by power of 2.  
**IMP2** Integer multiplication by power of 2.  
**IPOWER** Integer power.  
**IPP2P** Integral polynomial power of 2 product.  
**IPOWREAD** Integral polynomial power read.  
**PDPV** Polynomial division by power of variable.  
**PMPMV** Polynomial multiplication by power of main variable.  
**RNP2** Rational number power of 2.  
**RPOWREAD** Rational polynomial power read.

#### precision

**IPRCH** Integral polynomial real root calculation, high precision.  
**IPRCHS** Integral polynomial real root calculation, high-precision special.  
**SFCCON** Single-precision floating-point complex conjugation.  
**SFCDIF** Single-precision floating-point complex difference.  
**SFCFR** Single-precision floating-point complex from real.  
**SFCIP** Single-precision floating-point complex, imaginary part.  
**SFCMSQ** Single-precision floating-point complex modulus squared.  
**SFCNEG** Single-precision floating-point complex negation.  
**SFCPR** Single-precision floating-point complex product.  
**SFCQ** Single-precision floating-point complex quotient.  
**SFCRP** Single-precision floating-point complex, real part.  
**SFCSUM** Single-precision floating-point complex sum.  
**SFIFI** Single-precision floating-point interval from integer.  
**SFRABS** Single-precision floating-point real absolute value.  
**SFRDIF** Single-precision floating-point real difference.  
**SFRLS** Single-precision floating-point real number lower sum.  
**SFRNEG** Single-precision floating-point real negation.  
**SFRPR** Single-precision floating-point real product.  
**SFRQ** Single-precision floating-point real quotient.  
**SFRSUM** Single-precision floating-point real sum.

#### preparation

**IPRCNP** Integral polynomial real root calculation, Newton method preparation.

**primality**

**ISPT** Integer selfridge primality test.

**prime**

**DPGEN** Digit prime generator.

**GDPGEN** Gaussian digit prime generator.

**ILPDS** Integer large prime divisor search.

**IMPDS** Integer medium prime divisor search.

**ISPD** Integer small prime divisors.

**primitive**

**ANIPE** Algebraic number isolating interval for a primitive element.

**ANPEDE** [Algebraic number primitive element for a double extension.

**ANREPE** Algebraic number represent element of a primitive extension.

**IPCPP** Integral polynomial content and primitive part.

**IPICPP** Integral polynomial integer content and primitive part.

**IPIPP** Integral polynomial integer primitive part.

**IPLCPP** Integral polynomial list of contents and primitive parts.

**IPPGSD** Integral polynomial primitive greatest squarefree divisor.

**IPPP** Integral polynomial primitive part.

**IPSCPP** Integral polynomial sign, content, and primitive part.

**MPUCPP** Modular polynomial univariate content and primitive part.

**MPUPP** Modular polynomial univariate primitive part.

**principal**

**IPPS** Integral polynomial principal subresultant coefficients.

**problem**

**ASSPR** Assignment problem.

**process**

**ARGSACLIB** Process the command line arguments.

**product**

**AFPAFP** Algebraic number field polynomial algebraic number field element product.

**AFPPR** Algebraic number field polynomial product.

**AFPROD** Algebraic number field element product.

**ANPROD** Algebraic number product.

**CPLEXN** Cartesian product, lexicographically next.

**DMPPRD** Dense modular polynomial product.

**DPR** Digit product.

**IDIPR2** Integer digit inner product, length 2.

**IDPR** Integer-digit product.

**IPIP** Integral polynomial integer product.

**IPIPR** Integral polynomial mod ideal product.

**IPP2P** Integral polynomial power of 2 product.

**IPPROD** Integral polynomial product.

**IPROD** Integer product.

**IPRODK** Integer product, karatsuba algorithm.

**IPTPR** Integral polynomial truncated product.

**IUPTPR** Integral univariate polynomial truncated product.

**MAIPP** Matrix of integral polynomials product.

**MDPROD** Modular digit product.

**MIPIPR** Modular integral polynomial mod ideal product.  
**MIPPR** Modular integral polynomial product.  
**MIPROD** Modular integer product.  
**MPMDP** Modular polynomial modular digit product.  
**MPPROD** Modular polynomial product.  
**MPUP** Modular polynomial univariate product.  
**RIPROD** Rational interval product.  
**RIRNP** Rational interval rational number product.  
**RNPROD** Rational number product.  
**RPPROD** Rational polynomial product.  
**RPRNP** Rational polynomial rational number product.  
**SFCPR** Single-precision floating-point complex product.  
**SFRPR** Single-precision floating-point real product.  
**VISPR** Vector of integers scalar product.  
**VMPIP** Vector of modular polynomial inner product.

**pseudo**

**IPPSR** Integral polynomial pseudo-remainder.  
**MPPSR** Modular polynomial pseudo-remainder.

**ptv**

**PTMV** Polynomial transpose main variables. **PTV** Polynomial transpose variables.

**q**

**MUPBQP** Modular univariate polynomial berlekamp Q polynomials construction.

**quadratic**

**IPIQH** Integral polynomial mod ideal quadratic hensel lemma.  
**IUPQH** Integral univariate polynomial quadratic hensel lemma.  
**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. **IUPQS** Integral univariate polynomial quotient substitution.  
**MPIQH** Modular polynomial mod ideal, quadratic Hensel lemma.  
**MPIQHL** Modular polynomial mod ideal quadratic hensel lemma, list.  
**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single variable.

**quotient**

**AFPAFQ** Algebraic number field polynomial algebraic number field element quotient.  
**AFPQR** Algebraic number field polynomial quotient and remainder.  
**AFQ** Algebraic number field quotient.  
**DQR** Digit quotient and remainder.  
**IDQ** Integer-digit quotient.  
**IDQR** Integer-digit quotient and remainder.  
**IPIQ** Integral polynomial integer quotient.  
**IPQ** Integral polynomial quotient.  
**IPQR** Integral polynomial quotient and remainder.  
**IQ** Integer quotient.  
**IQR** Integer quotient and remainder.  
**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. **IUPQS** Integral univariate polynomial quotient substitution.  
**MDQ** Modular digit quotient.  
**MIQ** Modular integer quotient.

**MIUPQR** Modular integral univariate polynomial quotient and remainder.  
**MMPIQR** Modular monic polynomial mod ideal quotient and remainder.  
**MPQ** Modular polynomial quotient.  
**MPQR** Modular polynomial quotient and remainder.  
**MPUQ** Modular polynomial univariate quotient.  
**QREM** Quotient and remainder.  
**RNQ** Rational number quotient.  
**RPQR** Rational polynomial quotient and remainder.  
**SFCQ** Single-precision floating-point complex quotient.  
**SFRQ** Single-precision floating-point real quotient.

#### random

**BITRAN** Bit, random.  
**DRAN** Digit, random.  
**DRANN** Digit, random non-negative.  
**IPRAN** Integral polynomial, random.  
**IRAND** Integer, random.  
**MDRAN** Modular digit, random.  
**MIPRAN** Modular integral polynomial, random.  
**MIRAN** Modular integer, random.  
**MPRAN** Modular polynomial, random.  
**MUPRAN** Modular univariate polynomial, random.  
**PARTR** Partition, random.  
**PERMR** Permutation, random.  
**RNRAND** Rational number, random.

#### rational

**AFFRN** Algebraic number field element from rational number.  
**AFPFRP** Algebraic number field polynomial from rational polynomial.  
**AFUPSR** Algebraic number field univariate polynomial, sign at a rational point.  
**AMUPBES** Algebraic module univariate polynomial, binary rational evaluation of sign.  
**AMUPSR** Algebraic module univariate polynomial, sign at a rational point.  
**DIRPREAD** Distributive rational polynomial read.  
**DIRPWRITE** Distributive rational polynomial write.  
**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.  
**IPBREI** Integral polynomial binary rational evaluation, integral polynomial result.  
**IPFRP** Integral polynomial from rational polynomial.  
**IPSRP** Integral polynomial similar to rational polynomial.  
**IUPBEI** Integral univariate polynomial binary rational evaluation, integer output.  
**IUPBES** Integral univariate polynomial binary rational evaluation of sign.  
**IUPBRE** Integral univariate polynomial binary rational evaluation.  
**RIB** Rational interval bisection.  
**RIL** Rational interval length.  
**RILC** Rational interval length comparison.  
**RINEG** Rational interval negation.  
**RINT** Rational interval normalizing transformation.  
**RIPROD** Rational interval product.

**RIRNP** Rational interval rational number product.  
**RIRNP** Rational interval rational number product.  
**RISIGN** Rational interval sign.  
**RISUM** Rational interval sum.  
**RNABS** Rational number absolute value.  
**RNBCR** Rational number binary common representation.  
**RNCEIL** Rational number, ceiling of.  
**RNCOMP** Rational number comparison.  
**RNDEN** Rational number denominator.  
**RNDIF** Rational number difference.  
**RNDWRITE** Rational number decimal write.  
**RNFCL2** Rational number floor and ceiling of logarithm, base 2.  
**RNFLOr** Rational number, floor of.  
**RNINT** Rational number from integer.  
**RNINV** Rational number inverse.  
**RNMAX** Rational number max.  
**RNMIN** Rational number min.  
**RNNEG** Rational number negative.  
**RNNUM** Rational number numerator.  
**RNP2** Rational number power of 2.  
**RNPROD** Rational number product.  
**RNQ** Rational number quotient.  
**RNRAND** Rational number, random.  
**RNREAD** Rational number read.  
**RNRED** Rational number reduction to lowest terms.  
**RNSIGN** Rational number sign.  
**RNSUM** Rational number sum.  
**RNWRITE** Rational number write.  
**RPAFME** Rational polynomial, algebraic number field multiple evaluation.  
**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.  
**RPDIF** Rational polynomial difference.  
**RPDMV** Rational polynomial derivative, main variable.  
**RPDWRITE** Rational Polynomial Distributive Write.  
**RPEMV** Rational polynomial evaluation, main variable.  
**RPEXPREAD** Rational polynomial expression read.  
**RPFACtREAD** Rational polynomial factor read.  
**RPFIP** Rational polynomial from integral polynomial.  
**RPIMV** Rational polynomial integration, main variable.  
**RPMAIP** Rational polynomial monic associate of integral polynomial.  
**RPNEG** Rational polynomial negative.  
**RPPOWREAD** Rational polynomial power read.  
**RPPROD** Rational polynomial product.  
**RPQR** Rational polynomial quotient and remainder.  
**RPREAD** Rational polynomial read.  
**RPRNP** Rational polynomial rational number product.  
**RPRNP** Rational polynomial rational number product.  
**RPSUM** Rational polynomial sum.  
**RPTERMREAD** Rational polynomial term read.  
**RPWRITE** Rational polynomial write.

**RUPWRITE** Rational univariate polynomial write.

**read**

**AREAD** Atom read.

**CREAD** Character read.

**CREADB** Character read.

**DIIPREAD** Distributive integral polynomial read.

**DIRPREAD** Distributive rational polynomial read.

**GREAD** Gamma-integer read.

**IPEXPREAD** Integral polynomial expression read.

**IPEXPREADR** Integral polynomial expression read, remove terminating character.

**IPFACTREAD** Integral polynomial factor read.

**IPPOWREAD** Integral polynomial power read.

**IPREAD** Integral polynomial read.

**IPTERMREAD** Integral polynomial term read.

**IREAD** Integer read.

**LREAD** List read.

**OREAD** Object read.

**RNREAD** Rational number read.

**RPEXPREAD** Rational polynomial expression read.

**RPFACTREAD** Rational polynomial factor read.

**RPPOWREAD** Rational polynomial power read.

**RPREAD** Rational polynomial read.

**RPTERMREAD** Rational polynomial term read.

**VLREAD** Variable list read.

**VREAD** Variable read.

**real**

**AFPBRI** Algebraic number field polynomial basis real root isolation.

**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.

**AFPRII** Algebraic number field polynomial real root isolation induction.

**AFPRLS** Algebraic number field polynomial real root list separation.

**AFPRRI** Algebraic number field polynomial relative real root isolation.

**AFPRRS** Algebraic number field polynomial real root separation.

**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.

**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.

**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.

**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.

**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.

**AFUPRLS** Algebraic number field univariate polynomial real root list separation.

**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.

**AFUPRRS** Algebraic number field univariate polynomial real root separation.

**AMUPMPR** Algebraic module univariate polynomial minimal polynomial of



a real root.

**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**AMUPRLS** Algebraic module univariate polynomial real root list separation.

**AMUPRRS** Algebraic module univariate polynomial real root separation.

**IPLRRI** Integral polynomial list real root isolation.

**IPRCH** Integral polynomial real root calculation, high precision.

**IPRCHS** Integral polynomial real root calculation, high-precision special.

**IPRCN1** Integral polynomial real root calculation, 1 root.

**IPRCNP** Integral polynomial real root calculation, Newton method preparation.

**IPRICL** Integral polynomial real root isolation, Collins-Loos algorithm.

**IPRIM** Integral polynomial real root isolation, modified Uspensky method.

**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.

**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.

**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.

**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.

**IPRRII** Integral polynomial real root isolation induction.

**IPRRLS** Integral polynomial real root list separation.

**IPRRRI** Integral polynomial relative real root isolation.

**IPRRS** Integral polynomial real root separation.

**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.

**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

**SFCFR** Single-precision floating-point complex from real.

**SFCRP** Single-precision floating-point complex, real part.

**SFRABS** Single-precision floating-point real absolute value.

**SFRDIF** Single-precision floating-point real difference.

**SFRLS** Single-precision floating-point real number lower sum.

**SFRNEG** Single-precision floating-point real negation.

**SFRPR** Single-precision floating-point real product.

**SFRQ** Single-precision floating-point real quotient.

**SFRSUM** Single-precision floating-point real sum.

**reciprocal**

**PRT** Polynomial reciprocal transformation.

**reduced**

**IPRPRS** Integral polynomial reduced polynomial remainder sequence.

**reduction**

**RNRED** Rational number reduction to lowest terms.

**VIERED** Vector of integers, element reduction.

**reductum**

**PRED** Polynomial reductum.

**RED** Reductum 1.

**RED2** Reductum 2.

**RED3** Reductum 3.  
**RED4** Reductum 4.  
**REDI** Reductum.  
**SRED** Set reductum.

**refinement**  
**AFUPIIR** Algebraic number field polynomial isolating interval refinement.  
**AMSIGNIR** Algebraic module sign, interval refinement.  
**AMUPIIR** Algebraic module polynomial isolating interval refinement.  
**AMUPVARIR** Algebraic module univariate polynomial variations, interval refinement.  
**ISFPIR** Integral squarefree polynomial isolating interval refinement.  
**IUPIIR** Integral univariate polynomial isolating interval refinement.

**relative**  
**AFPRRI** Algebraic number field polynomial relative real root isolation.  
**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.  
**IPRRRI** Integral polynomial relative real root isolation.

**remainder**  
**AFPQR** Algebraic number field polynomial quotient and remainder.  
**DMUPNR** Dense modular univariate polynomial natural remainder.  
**DQR** Digit quotient and remainder.  
**IDQR** Integer-digit quotient and remainder.  
**IDREM** Integer-digit remainder.  
**IPCRA** Integral polynomial chinese remainder algorithm.  
**IPPSR** Integral polynomial pseudo-remainder.  
**IPQR** Integral polynomial quotient and remainder.  
**IPRPRS** Integral polynomial reduced polynomial remainder sequence.  
**IPSPRS** Integral polynomial subresultant polynomial remainder sequence.  
**IQR** Integer quotient and remainder.  
**IREM** Integer remainder.  
**IUPSR** Integral univariate polynomial semi-remainder.  
**MDCRA** Modular digit chinese remainder algorithm.  
**MDLCRA** Modular digit list chinese remainder algorithm.  
**MIDCRA** Modular integer digit chinese remainder algorithm.  
**MIUPQR** Modular integral univariate polynomial quotient and remainder.  
**MMPIQR** Modular monic polynomial mod ideal quotient and remainder.  
**MPPSR** Modular polynomial pseudo-remainder.  
**MPQR** Modular polynomial quotient and remainder.  
**MPSPRS** Modular polynomial subresultant polynomial remainder sequence.  
**QREM** Quotient and remainder.  
**REM** GAMMA-digit remainder.  
**RPQR** Rational polynomial quotient and remainder.

**remove**  
**IEXPREADR** Integral polynomial expression read, remove terminating character.

**represent**  
**ANREPE** Algebraic number represent element of a primitive extension.

**representation**  
**AFCR** Algebraic number field element convert representation.  
**AFICR** Algebraic number field element inverse convert representation.

**AFPCR** Algebraic number field polynomial convert representation.  
**AFPICR** Algebraic number field polynomial inverse convert representation.  
**RNBCR** Rational number binary common representation.

**representatives**

**SDR** System of distinct representatives.

**residue**

**FRESL** Fermat residue list.  
**FRLSM** Fermat residue list, single modulus.

**respect**

**MCPMV** Matrix of coefficients of polynomials, with respect to main variable.

**result**

**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.  
**IPBREI** Integral polynomial binary rational evaluation, integral polynomial result.

**resultant**

**IPRES** Integral polynomial resultant.  
**IUPRC** Integral univariate polynomial resultant and cofactor.  
**MPRES** Modular polynomial resultant.  
**MUPRC** Modular univariate polynomial resultant and cofactor.  
**MUPRES** Modular univariate polynomial resultant.

**ring**

**PFBRE** Polynomial From Base Ring Element.

**root**

**AFPBRI** Algebraic number field polynomial basis real root isolation.  
**AFPRCL** Algebraic number field polynomial real root isolation, collins-loos algorithm.  
**AFPRII** Algebraic number field polynomial real root isolation induction.  
**AFPRLS** Algebraic number field polynomial real root list separation.  
**AFPRRI** Algebraic number field polynomial relative real root isolation.  
**AFPRRS** Algebraic number field polynomial real root separation.  
**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.  
**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.  
**AFUPRB** Algebraic number field univariate polynomial root bound.  
**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.  
**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.  
**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.  
**AFUPRL** Algebraic number field univariate polynomial, root of a linear polynomial.  
**AFUPRLS** Algebraic number field univariate polynomial real root list separation.  
**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.  
**AFUPRRS** Algebraic number field univariate polynomial real root separation.  
**AMUPMPR** Algebraic module univariate polynomial minimal polynomial of

a real root.

**AMUPRBH** Algebraic module univariate polynomial root bound and homothetic transformation.

**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.

**AMUPRLS** Algebraic module univariate polynomial real root list separation.

**AMUPRRS** Algebraic module univariate polynomial real root separation.

**DSQRTF** Digit square root function.

**IPLRRI** Integral polynomial list real root isolation.

**IPRCH** Integral polynomial real root calculation, high precision.

**IPRCHS** Integral polynomial real root calculation, high-precision special.

**IPRCN1** Integral polynomial real root calculation, 1 root.

**IPRCN1** Integral polynomial real root calculation, 1 root.

**IPRCNP** Integral polynomial real root calculation, Newton method preparation.

**IPRICL** Integral polynomial real root isolation, Collins-Loos algorithm.

**IPRIM** Integral polynomial real root isolation, modified Uspensky method.

**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.

**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.

**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.

**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.

**IPRRRI** Integral polynomial real root isolation induction.

**IPRRLS** Integral polynomial real root list separation.

**IPRRRI** Integral polynomial relative real root isolation.

**IPRRS** Integral polynomial real root separation.

**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.

**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

**IROOT** Integer root.

**ISQRT** Integer square root.

**IUPRB** Integral univariate polynomial root bound.

**IUPRLP** Integral univariate polynomial, root of a linear polynomial.

**rosser**

**LDSSBR** Linear diophantine system solution, based on Rosser ideas.

**rotation**

**LEROT** List element rotation.

**routine**

**main** Default main routine.

**saclib**

**BEGINSACLIB** Begin SACLIB.

**ENDSACLIB** End saclib.

**INFOSACLIB** Write out usage information for SACLIB.

**STATSACLIB** Statistics of saclib.

**scalar**

**VISPR** Vector of integers scalar product.

**search**

**ILPDS** Integer large prime divisor search.

**IMPDS** Integer medium prime divisor search.

**LSRCH** List search.

**VLSRCH** Variable list search.

**second**

**IPFSD** Integral polynomial factorization, second derivative.

**IPSFSD** Integral squarefree factorization, second derivative.

**SECOND** Second.

**segmentation**

**ISEG** Integer segmentation.

**selfridge**

**ISPT** Integer selfridge primality test.

**semi**

**IUPSR** Integral univariate polynomial semi-remainder.

**separation**

**AFPRLS** Algebraic number field polynomial real root list separation.

**AFPRRS** Algebraic number field polynomial real root separation.

**AFUPRLS** Algebraic number field univariate polynomial real root list separation.

**AFUPRRS** Algebraic number field univariate polynomial real root separation.

**AMUPRLS** Algebraic module univariate polynomial real root list separation.

**AMUPRRS** Algebraic module univariate polynomial real root separation.

**IPRRLS** Integral polynomial real root list separation.

**IPRRS** Integral polynomial real root separation.

**sequence**

**IPRPRS** Integral polynomial reduced polynomial remainder sequence.

**IPSPRS** Integral polynomial subresultant polynomial remainder sequence.

**MPSPRS** Modular polynomial subresultant polynomial remainder sequence.

**set**

**CSFPAR** Characteristic set from partition.

**CSINT** Characteristic set intersection.

**CSSUB** Characteristic set subset.

**CSUN** Characteristic set union.

**GCASET** Garbage collected array set element.

**IUPFDS** Integral univariate polynomial factor degree set.

**SDIFF** Set difference.

**SEQUAL** Set equality.

**SFCS** Set from characteristic set.

**SFCS** Set from characteristic set.

**SFIRST** Set first element.

**SINTER** Set intersection.

**SLELTI** Set list element.

**SRED** Set reductum.

**SUNION** Set union.

**USDIFF** Unordered set difference.

**USINT** Unordered set intersection.

**USUN** Unordered set union.

**shifted**

**ISSUM** Integer shifted sum.

**sign**

**AFSIGN** Algebraic number field sign.

**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.

**AFUPSR** Algebraic number field univariate polynomial, sign at a rational point.

**AMSIGN** Algebraic module sign.

**AMSIGNIR** Algebraic module sign, interval refinement.

**AMUPBES** Algebraic module univariate polynomial, binary rational evaluation of sign.

**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.

**AMUPSR** Algebraic module univariate polynomial, sign at a rational point.

**IPSCPP** Integral polynomial sign, content, and primitive part.

**IPSIGN** Integral polynomial sign.

**ISIGNF** Integer sign function.

**IUPBES** Integral univariate polynomial binary rational evaluation of sign.

**RISIGN** Rational interval sign.

**RNSIGN** Rational number sign.

**RPBLGS** Rational polynomial base coefficients least common multiple, greatest common divisor, and sign.

**SIGN** Sign.

**similar**

**AMPSAFP** Algebraic module polynomial similar to algebraic field polynomial.

**similiar**

**IPSRP** Integral polynomial similiar to rational polynomial.

**single**

**FRLSM** Fermat residue list, single modulus.

**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single variable.

**SFCCON** Single-precision floating-point complex conjugation.

**SFCDIF** Single-precision floating-point complex difference.

**SFCFR** Single-precision floating-point complex from real.

**SFCIP** Single-precision floating-point complex, imaginary part.

**SFCMSQ** Single-precision floating-point complex modulus squared.

**SFCNEG** Single-precision floating-point complex negation.

**SFCPR** Single-precision floating-point complex product.

**SFCQ** Single-precision floating-point complex quotient.

**SFCRP** Single-precision floating-point complex, real part.

**SFCSUM** Single-precision floating-point complex sum.

**SFIFI** Single-precision floating-point interval from integer.

**SFRABS** Single-precision floating-point real absolute value.

**SFRDIF** Single-precision floating-point real difference.  
**SFRLS** Single-precision floating-point real number lower sum.  
**SFRNEG** Single-precision floating-point real negation.  
**SFRPR** Single-precision floating-point real product.  
**SFRQ** Single-precision floating-point real quotient.  
**SFRSUM** Single-precision floating-point real sum.

**small**

**ISPD** Integer small prime divisors.

**solution**

**LDSMKB** Linear diophantine system solution, modified Kannan and Bachem algorithm.  
**LDSSBR** Linear diophantine system solution, based on Rosser ideas.  
**MIPISE** Modular integral polynomial mod ideal, solution of equation.  
**MIUPSE** Modular integral univariate polynomial, solution of equation.

**sort**

**LBIBMS** List of BETA-integers bubble-merge sort.  
**LBIBS** List of BETA-integers bubble sort.  
**MICS** Matrix of integers column sort.

**space**

**MMDNSB** Matrix of modular digits null-space basis.

**special**

**IPRCHS** Integral polynomial real root calculation, high-precision special.  
**MUPFS** Modular univariate polynomial factorization, special.  
**PSDSV** Polynomial special decomposition, specified variable.

**specified**

**IPTR** Integral polynomial translation, specified variable.  
**IPTR1** Integral polynomial translation by one, specified variable.  
**PDEGSV** Polynomial degree, specified variable.  
**PSDSV** Polynomial special decomposition, specified variable.

**square**

**DSQRTE** Digit square root function.  
**ISQRT** Integer square root.

**squared**

**SFCMSQ** Single-precision floating-point complex modulus squared.

**squarefree**

**AFUPGS** Algebraic number field polynomial greatest squarefree divisor.  
**AFUPSF** Algebraic number field univariate polynomial squarefree factorization.  
**AFUPSFN** Algebraic number field univariate polynomial squarefree norm.  
**IPCSFB** Integral polynomial coarsest squarefree basis.  
**IPFSFB** Integral polynomial finest squarefree basis.  
**IPPGSD** Integral polynomial primitive greatest squarefree divisor.  
**IPSF** Integral polynomial squarefree factorization.  
**IPSFBA** Integral polynomial squarefree basis augmentation.  
**IPSFSD** Integral squarefree factorization, second derivative.  
**ISFPF** Integral squarefree polynomial factorization.  
**ISFPPIR** Integral squarefree polynomial isolating interval refinement.  
**ISPSFB** Integral squarefree polynomial squarefree basis.  
**ISPSFB** Integral squarefree polynomial squarefree basis.  
**IUSFPF** Integral univariate squarefree polynomial factorization.

**MUPSFF** Modular univariate polynomial squarefree factorization.

**standard**

**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.

**IPSIFI** Integral polynomial standard isolating interval from isolating interval.

**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

**IUPVSI** Integral univariate polynomial, variations for standard interval.

**statistics**

**STATSACLIB** Statistics of saclib.

**stream**

**FILINE** Flush the input stream line.

**string**

**LFS** List from String.

**SWRITE** String write.

**strong**

**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.

**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

**strongly**

**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**IPIIWS** Integral polynomial isolating intervals weakly disjoint to strongly disjoint.

**subresultant**

**IPPSC** Integral polynomial principal subresultant coefficients.

**IPSPRS** Integral polynomial subresultant polynomial remainder sequence.

**MPSPRS** Modular polynomial subresultant polynomial remainder sequence.

**subroutine**

**IPICS** Integral polynomial integer content subroutine.

**MPUCS** Modular polynomial univariate content subroutine.

**subset**

**CSSUB** Characteristic set subset.

**substitution**

**IPGSUB** Integral polynomial general substitution.

**IPSMV** Integral polynomial substitution for main variable.

**IPSUB** Integral polynomial substitution.

**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
Integral univariate polynomial quotient substitution.

**suffix**

**SUFFIX** Suffix.

**sum**

**AFPSUM** Algebraic number field polynomial sum.

**AFSUM** Algebraic number field element sum.

**ANSUM** Algebraic number sum.

**DMPSUM** Dense modular polynomial sum.

**IBCPS** Integer binomial coefficient partial sum.

**IPSUM** Integral polynomial sum.



**IPSUMN** Integral polynomial sum norm.  
**ISSUM** Integer shifted sum.  
**ISUM** Integer sum.  
**MDSUM** Modular digit sum.  
**MIPSUM** Modular integral polynomial sum.  
**MISUM** Modular integer sum.  
**MPSUM** Modular polynomial sum.  
**RISUM** Rational interval sum.  
**RNSUM** Rational number sum.  
**RPSUM** Rational polynomial sum.  
**SFCSUM** Single-precision floating-point complex sum.  
**SFRLS** Single-precision floating-point real number lower sum.  
**SFRSUM** Single-precision floating-point real sum.  
**VISUM** Vector of integers sum.

**sumset**

**PARTSS** Partition sumset.

**symmetric**

**MIPFSM** Modular integral polynomial from symmetric modular.  
   **SMFMI** Symmetric modular from modular integer.  
   **SMFMIP** Symmetric modular from modular integral polynomial.

**system**

**GCSI** Garbage collection, system independent.  
   **LDMSKB** Linear diophantine system solution, modified Kannan and Bachem algorithm.  
   **LDSSBR** Linear diophantine system solution, based on Rosser ideas.  
   **SDR** System of distinct representatives.

**term**

**DIPINS** Distributive polynomial, insert term.  
   **IPTERMREAD** Integral polynomial term read.  
   **RPTERMREAD** Rational polynomial term read.

**terminating**

**IPEXPREADR** Integral polynomial expression read, remove terminating character.

**terms**

**RNRED** Rational number reduction to lowest terms.

**test**

**ISATOM** Test for atom.  
   **ISGCA** Test for GCA handle.  
   **ISLIST** Test for non-empty list.  
   **ISNIL** Test for empty list.  
   **ISOBJECT** Test for object.  
   **ISPT** Integer selfridge primality test.  
   **ISZERO** Test for zero.  
   **MEMBER** Membership test.  
   **PUNT** Polynomial univariate test.

**third**

**THIRD** Third.

**time**

**ACLOCK** Clock minus garbage collection time.

**trailing**

**PTBCF** Polynomial trailing base coefficient.

**transformation**

**AMUPBHT** Algebraic module univariate polynomial binary homothetic transformation.

**AMUPNT** Algebraic module univariate polynomial negative transformation.

**AMUPRBH** Algebraic module univariate polynomial root bound and homothetic transformation.

**IPBHT** Integral polynomial binary homothetic transformation.

**IPBHTLV** Integral polynomial binary homothetic transformation, leading variable.

**IPBHTMV** Integral polynomial binary homothetic transformation, main variable.

**IPNT** Integral polynomial negative transformation.

**IPVCHT** Integral polynomial variations after circle to half-plane transformation.

**IUPBHT** Integral univariate polynomial binary homothetic transformation.

**IUPCHT** Integral univariate polynomial circle to half-plane transformation.

**IUPIHT** Integral univariate polynomial integer homothetic transformation.

**IUPNT** Integral univariate polynomial negative transformation.

**MINNCT** Matrix of integers, non-negative column transformation.

**PRT** Polynomial reciprocal transformation.

**RINT** Rational interval normalizing transformation.

**VIUT** Vector of integers, unimodular transformation.

**translation**

**AMUPTR** Algebraic module univariate polynomial translation.

**AMUPTR1** Algebraic module univariate polynomial translation by 1.

**IPTR** Integral polynomial translation, specified variable.

**IPTR1** Integral polynomial translation by one, specified variable.

**IPTR1LV** Integral polynomial translation by one, leading variable.

**IPTRAN** Integral polynomial translation.

**IPTRLV** Integral polynomial translation, leading variable.

**IPTRMV** Integral polynomial translation, main variable.

**IUPTR** Integral univariate polynomial translation.

**IUPTR1** Integral univariate polynomial translation by 1.

**transpose**

**PTMV** Polynomial transpose main variables. **PTV** Polynomial transpose variables.

**PTMV** Polynomial transpose main variables. **PTV** Polynomial transpose variables.

**truncated**

**IPTPR** Integral polynomial truncated product.

**IUPTPR** Integral univariate polynomial truncated product.

**truncation**

**IPTRUN** Integral polynomial truncation.

**ITRUNC** Integer truncation.

**unimodular**

**VIUT** Vector of integers, unimodular transformation.

**union**

**CSUN** Characteristic set union.

**SUNION** Set union.

**USUN** Unordered set union.

**unit**

**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.

**univariate**

**AFUPBRI** Algebraic number field univariate polynomial basis real root isolation.

**AFUPFAC** Algebraic number field univariate polynomial factorization.

**AFUPGC** Algebraic number field univariate polynomial greatest common divisor and cofactors.

**AFUPIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AFUPMPR** Algebraic number field univariate polynomial minimal polynomial of a real root.

**AFUPRB** Algebraic number field univariate polynomial root bound.

**AFUPRICL** Algebraic number field univariate polynomial real root isolation, Collins-Loos algorithm.

**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.

**AFUPRII** Algebraic number field univariate polynomial real root isolation induction.

**AFUPRL** Algebraic number field univariate polynomial, root of a linear polynomial.

**AFUPRLS** Algebraic number field univariate polynomial real root list separation.

**AFUPRRI** Algebraic number field univariate polynomial relative real root isolation.

**AFUPRRS** Algebraic number field univariate polynomial real root separation.

**AFUPSF** Algebraic number field univariate polynomial squarefree factorization.

**AFUPSFN** Algebraic number field univariate polynomial squarefree norm.

**AFUPSR** Algebraic number field univariate polynomial, sign at a rational point.

**AFUPVAR** Algebraic number field univariate polynomial variations.

**AFUPWRITE** Algebraic number field univariate polynomial write.

**AMUPBES** Algebraic module univariate polynomial, binary rational evaluation of sign.

**AMUPBHT** Algebraic module univariate polynomial binary homothetic transformation.

**AMUPIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPMPR** Algebraic module univariate polynomial minimal polynomial of a real root.

**AMUPNT** Algebraic module univariate polynomial negative transformation.

**AMUPRBH** Algebraic module univariate polynomial root bound and homothetic transformation.

**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**AMUPRINC** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.  
**AMUPRLS** Algebraic module univariate polynomial real root list separation.  
**AMUPRRS** Algebraic module univariate polynomial real root separation.  
**AMUPSR** Algebraic module univariate polynomial, sign at a rational point.  
**AMUPTR** Algebraic module univariate polynomial translation.  
**AMUPTR1** Algebraic module univariate polynomial translation by 1.  
**AMUPVARIR** Algebraic module univariate polynomial variations, interval refinement.  
**DMUPNR** Dense modular univariate polynomial natural remainder.  
**IUPBEI** Integral univariate polynomial binary rational evaluation, integer output.  
**IUPBES** Integral univariate polynomial binary rational evaluation of sign.  
**IUPBHT** Integral univariate polynomial binary homothetic transformation.  
**IUPBRE** Integral univariate polynomial binary rational evaluation.  
**IUPCHT** Integral univariate polynomial circle to half-plane transformation.  
**IUPFAC** Integral univariate polynomial factorization.  
**IUPFDS** Integral univariate polynomial factor degree set.  
**IUPIHT** Integral univariate polynomial integer homothetic transformation.  
**IUPIIR** Integral univariate polynomial isolating interval refinement.  
**IUPNT** Integral univariate polynomial negative transformation.  
**IUPQH** Integral univariate polynomial quadratic hensel lemma.  
**IUPQHL** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
Integral univariate polynomial quotient substitution.  
**IUPVSI** Integral univariate polynomial quadratic hensel lemma, list. IUPQS  
Integral univariate polynomial quotient substitution.  
**IUPRB** Integral univariate polynomial root bound.  
**IUPRC** Integral univariate polynomial resultant and cofactor.  
**IUPRLP** Integral univariate polynomial, root of a linear polynomial.  
**IUPSR** Integral univariate polynomial semi-remainder.  
**IUPTPR** Integral univariate polynomial truncated product.  
**IUPTR** Integral univariate polynomial translation.  
**IUPTR1** Integral univariate polynomial translation by 1.  
**IUPVAR** Integral univariate polynomial variations.  
**IUPVOI** Integral univariate polynomial, variations for open interval.  
**IUPVSI** Integral univariate polynomial, variations for standard interval.  
**IUPWRITE** Integral univariate polynomial write.  
**IUSFPF** Integral univariate squarefree polynomial factorization.  
**MIUPQR** Modular integral univariate polynomial quotient and remainder.  
**MIUPSE** Modular integral univariate polynomial, solution of equation.  
**MPUC** Modular polynomial univariate content.  
**MPUCPP** Modular polynomial univariate content and primitive part.  
**MPUCS** Modular polynomial univariate content subroutine.  
**MPUP** Modular polynomial univariate product.  
**MPUPP** Modular polynomial univariate primitive part.  
**MPUQ** Modular polynomial univariate quotient.  
**MUPBQP** Modular univariate polynomial berlekamp Q polynomials construction.  
**MUPDDF** Modular univariate polynomial distinct degree factorization.  
**MUPDER** Modular univariate polynomial derivative.

**MUPEGC** Modular univariate polynomial extended greatest common divisor.  
**MUPFBL** Modular univariate polynomial factorization-berlekamp algorithm.  
**MUPFS** Modular univariate polynomial factorization, special.  
**MUPGCD** Modular univariate polynomial greatest common divisor.  
**MUPHEG** Modular univariate polynomial half-extended greatest common divisor.  
**MUPRAN** Modular univariate polynomial, random.  
**MUPRC** Modular univariate polynomial resultant and cofactor.  
**MUPRES** Modular univariate polynomial resultant.  
**MUPSFF** Modular univariate polynomial squarefree factorization.  
**PUPF** Polynomial, univariate, from polynomial.  
**PUNT** Polynomial univariate test.  
**RUPWRITE** Rational univariate polynomial write.

**unordered**

**USDIFF** Unordered set difference.  
**USINT** Unordered set intersection.  
**USUN** Unordered set union.

**usage**

**INFOSACLIB** Write out usage information for SACLIB.

**uspensky**

**IPRIM** Integral polynomial real root isolation, modified Uspensky method.  
**IPRIMO** Integral polynomial real root isolation, modified Uspensky method, open interval.  
**IPRIMS** Integral polynomial real root isolation, modified Uspensky method, standard interval.  
**IPRIMU** Integral polynomial real root isolation, modified Uspensky method, unit interval.  
**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.  
**IPSRM** Integral polynomial strong real root isolation, modified Uspensky method.  
**IPSRMS** Integral polynomial strong real root isolation, modified Uspensky method, standard interval.

**value**

**ABS** Absolute value.  
**IABSF** Integer absolute value function.  
**IPABS** Integral polynomial absolute value.  
**RNABS** Rational number absolute value.  
**SFRABS** Single-precision floating-point real absolute value.

**variable**

**AFPCMV** Algebraic number field polynomial composition in main variable.  
**AFPDMV** Algebraic number field polynomial derivative, main variable.  
**AFPEMV** Algebraic number field polynomial evaluation of main variable.  
**AMPDMV** Algebraic module polynomial derivative, main variable.  
**GCGLOBAL** Declare a global variable to the Garbage Collector.  
**IPBEILV** Integral polynomial binary rational evaluation, integral polynomial result, leading variable.  
**IPBHTLV** Integral polynomial binary homothetic transformation, leading variable.  
**IPBHTMV** Integral polynomial binary homothetic transformation, main variable.

**IPDMV** Integral polynomial derivative, main variable.  
**IPEMV** Integral polynomial evaluation of main variable.  
**IPHDMV** Integral polynomial higher derivative, main variable.  
**IPSMV** Integral polynomial substitution for main variable.  
**IPTR** Integral polynomial translation, specified variable.  
**IPTR1** Integral polynomial translation by one, specified variable.  
**IPTR1LV** Integral polynomial translation by one, leading variable.  
**IPTRLV** Integral polynomial translation, leading variable.  
**IPTRMV** Integral polynomial translation, main variable.  
**MCPMV** Matrix of coefficients of polynomials, with respect to main variable.  
**MPEMV** Modular polynomial evaluation of main variable.  
**MPIQHS** Modular polynomial mod ideal, quadratic Hensel lemma on a single variable.  
**PDEGSV** Polynomial degree, specified variable.  
**PDPV** Polynomial division by power of variable.  
**PMPMV** Polynomial multiplication by power of main variable.  
**PSDSV** Polynomial special decomposition, specified variable.  
**RPDMV** Rational polynomial derivative, main variable.  
**RPEMV** Rational polynomial evaluation, main variable.  
**RPIMV** Rational polynomial integration, main variable.  
**VLREAD** Variable list read.  
**VLSRCH** Variable list search.  
**VLWRITE** Variable list write.  
**VREAD** Variable read.  
**VWRITE** Variable write.

#### variables

**PCONST** Polynomial constant. **PCPV** Polynomial cyclic permutation of variables.  
**PFDP** Polynomial from dense polynomial. **PICPV** Polynomial inverse cyclic permutation of variables.  
**PINV** Polynomial introduction of new variables.  
**PPERMV** Polynomial permutation of variables.  
**PTMV** Polynomial transpose main variables. **PTV** Polynomial transpose variables.  
**PTMV** Polynomial transpose main variables. **PTV** Polynomial transpose variables.

#### variation

**AFUPRICS** Algebraic univariate polynomial real root isolation, coefficient sign variation method.  
**AMUPRICS** Algebraic module univariate polynomial real root isolation, coefficient sign variation method.  
**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.  
**AMUPRINCS** Algebraic module univariate polynomial root isolation, normalized coefficient sign variation method.

#### variations

**AFUPVAR** Algebraic number field univariate polynomial variations.  
**AMUPVARIR** Algebraic module univariate polynomial variations, interval refinement.  
**IPVCHT** Integral polynomial variations after circle to half-plane transform.

tion.

**IUPVAR** Integral univariate polynomial variations.

**IUPVOI** Integral univariate polynomial, variations for open interval.

**IUPVSI** Integral univariate polynomial, variations for standard interval.

**vector**

**DVCMP** Degree vector comparison.

**PDEGV** Polynomial degree vector.

**VCOMP** Vector comparison.

**VIAZ** Vector of integers, adjoin zeros.

**VIDIF** Vector of integers difference.

**VIERED** Vector of integers, element reduction.

**VILCOM** Vector of integers linear combination.

**VINEG** Vector of integers negation.

**VISPR** Vector of integers scalar product.

**VISUM** Vector of integers sum.

**VIUT** Vector of integers, unimodular transformation.

**VMAX** Vector maximum.

**VMIN** Vector minimum.

**VMPIP** Vector of modular polynomial inner product.

**weakly**

**AFUPIIWS** Algebraic number field univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPIIWS** Algebraic module univariate polynomial isolating intervals weakly disjoint to strongly disjoint.

**AMUPRICSW** Algebraic module univariate polynomial real root isolation, coefficient sign variation method, weakly disjoint intervals.

**IPIIWS** Integral polynomial isolating intervals weakly disjoint to strongly disjoint.

**IPRIMW** Integral polynomial real root isolation, modified Uspensky method, weakly disjoint intervals.

**with**

**MCPMV** Matrix of coefficients of polynomials, with respect to main variable.

**write**

**AFDWRITE** Algebraic number field, decimal write.

**AFPWRITE** Algebraic number field polynomial write.

**AFUPWRITE** Algebraic number field univariate polynomial write.

**AFWRITE** Algebraic field element write.

**ANDWRITE** Algebraic number decimal write.

**AWRITE** Atom write.

**CWRITE** Character write.

**DIIPWRITE** Distributive integral polynomial write.

**DIRPWRITE** Distributive rational polynomial write.

**GWRITE** Gamma-integer write.

**ILWRITE** Integer list write.

**INFOSACLIB** Write out usage information for SACLIB.

**IPDWRITE** Integral Polynomial Distributive Write.

**IPWRITE** Integral polynomial write.

**IUPWRITE** Integral univariate polynomial write.

**IWRITE** Integer write.

**LWRITE** List write.

**OWRITE** Object write.  
**RNDWRITE** Rational number decimal write.  
**RNWRITE** Rational number write.  
**RPDWRITE** Rational Polynomial Distributive Write.  
**RPWRITE** Rational polynomial write.  
**RUPWRITE** Rational univariate polynomial write.  
**SWRITE** String write.  
**VLWRITE** Variable list write.  
**VWRITE** Variable write.  
**zero**  
**ISZERO** Test for zero.  
**zeros**  
**VIAZ** Vector of integers, adjoin zeros.  
**[algebraic**  
**ANPEDE** [Algebraic number primitive element for a double extension.