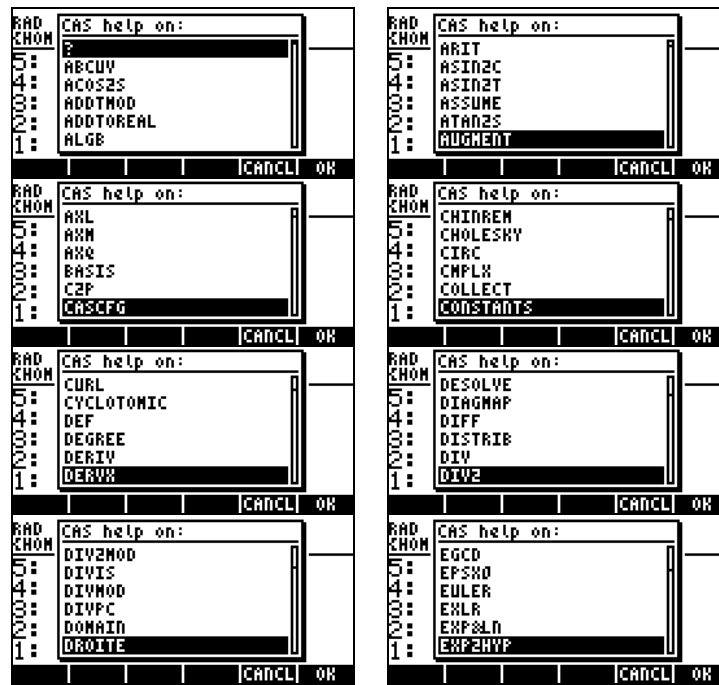


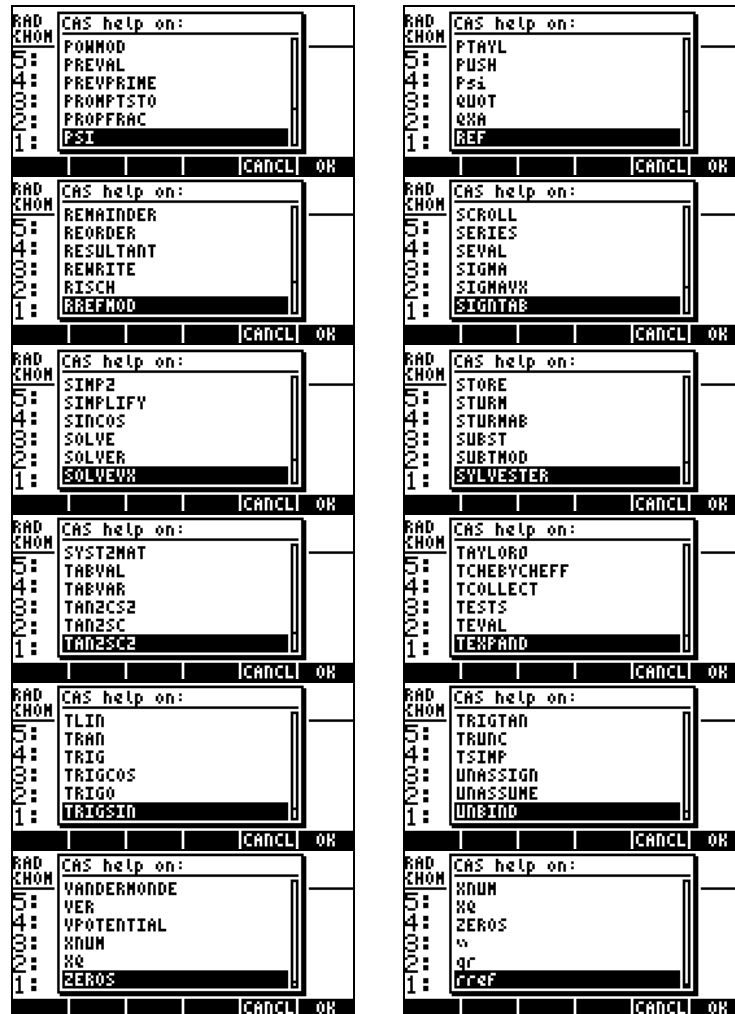
CAS HELP facility for the HP 49G+/HP 48GII calculators

The CAS HELP facility in the HP 49G+/HP 48GII calculators, accessible through **1** **2** **HELP** **^**, allows the user direct access to descriptions of the different calculator functions and commands associated with the calculator's CAS (Computer Algebraic System).

Commands available in the CAS HELP facility

The following screen shots show a listing of all the CAS HELP facility entries available in the HP 49G+ calculator's CAS. Screen shots showing the actual CAS HELP facility entries are shown in the next section.





CAS HELP facility entries in alphabetical order

The following screen shots show the CAS HELP facility entries in alphabetical order. The typical entry will show a brief explanation of the function or command operation, and an example of application. Copy the example to your screen by using ECHO in the HP 49G+ calculator, or type the example directly into your screen if using the HP 48GII (Make sure to use the algebraic

mode for your calculator). The screen will also show commands that are related to the current entry. If using the HP 49G+ calculator you can open related entries by pressing the soft menu keys SEE1 , SEE2 , or SEE3 . In the HP 49G+ calculator, the soft menu key MAIN will re-open the main list of CAS HELP facility entries, while the soft menu key EXIT will close the facility and return to the normal calculator display. Commands are grouped by subjects in the following section.

<p>?: The undefined symbol ?</p> <p>See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>ABCUV: Bézout polynomial equation $AU+BV=C$ (returns U V) $ABCUV(X+1,X-1,2)$ $(1 -1)$</p> <p>See: EGCD IABCUV EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>ACOS2S: Replaces $\text{acos}(x)$ with $\pi/2-\text{asin}(x)$ $ACOS2S(ACOS(X))$ $\pi/2-ASIN(X)$</p> <p>See: ASIN2C ASIN2T ATA EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>ADDTMOD: Adds two expressions modulo the current modulus $ADDTMOD(11X+5,8X+6)$ $6X-2$</p> <p>See: MODSTO EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>ADDTOREAL: Assumption on a variable to be real $ADDTOREAL(X)$ NOVAL</p> <p>See: ASSUME UNASSUME EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>ALGB: The algebra menu</p> <p>See: EXIT SEE1 SEE2 SEE3 MAIN</p>
<p>ARIT: The arithmetic menu</p> <p>See: EXIT SEE1 SEE2 SEE3 MAIN</p>	<p>ASIN2C: Replaces $\text{asin}(x)$ with $\pi/2-\text{acos}(x)$ $ASIN2C(ASIN(X))$ $\pi/2-ACOS(X)$</p> <p>See: ACOS2S ASIN2T ATA EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>ASIN2T: Replaces $\text{asin}(x)$ with $\text{atan}(x/\sqrt{1-x^2})$ $ASIN2T(ASIN(X))$ $ATAN(X/\sqrt{1-X^2})$</p> <p>See: ACOS2S ASIN2C ATA EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>ASSUME: Assumption on a vari- able (algebr. version) $ASSUME(X>0)$ $X>0$</p> <p>See: UNASSUME EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>

<p>ATAN2S: Replaces atan(x) with asin(x/√(x^2+1)) ATAN2S(ATAN(X)) ASIN(X/√(X^2+1))</p> <p>See: ACOS2S ASIN2C ASI EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>AUGMENT: Adds an object to a list, array or string AUGMENT((1,2),3) { 1 2 3 }</p> <p>See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>AXL: Array (←) list conver- sion AXL((1,2,3)) { 1 2 3 }</p> <p>See: AXM EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>AXM: Symbolic (↔) numeric matrix conversion AXM([1/2,2/3]) [.5 .666666666667]</p> <p>See: AXL EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>AXQ: Converts an array into the symb. quad. form AXQ([[1,1],[1,0]],[X,Y]) (X^2+2*X*Y [X Y])</p> <p>See: GAUSS SYLVESTER 0 EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>BASIS: Basis of a vector space BASIS([[1,0],[1,1]]) { [1 0] [0 1] }</p> <p>See: IMAGE IBASIS EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>C2P: Finds a permutation from its cyclical decomposition C2P(((1,3,4),(2))) { 3 2 4 1 }</p> <p>See: P2C CIRC EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>CASCFCG: Configures the CAS CASCFCG NOVAL</p> <p>See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>CHINREM: Chinese remainder for polynomials CHINREM([X,X^2],[X-1,X +1]) [-(X^2-X) X^3+X^2]</p> <p>See: EGCD ICHINREM EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>CHOLESKY: Cholesky decomposition of a symmetric matrix M=tP*P CHOLESKY([[4,1],[1,3]]) [[2 1/2] [0 1/2*√11]]</p> <p>See: SYLVESTER EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>CIRC: Composition of two permutations CIRC((3,2,1),(2,1,3)) { 2 3 1 }</p> <p>See: C2P P2C EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>CMPLX: Real and complex menu</p> <p>See: EXIT SEE1 SEE2 SEE3 MAIN</p>

COLLECT:
Recursive factorization of a polynomial over integers
COLLECT(X^2-4)
 $(X+2)*(X-2)$
See: EXPAND FACTOR

EXIT ECHO SEE1 SEE2 SEE3 MAIN

CURL:
Rotational of a 3-d vector field
CURL([SIN(Z),X+Y,Z^2],[X,Y,Z])
 [0 COS(Z) 1]

See: DIV DERIV

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DEF:
Defines a user function
DEF(F(X)=SIN(X))
 SIN(X)

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DERIV:
Returns the derivative with respect to the 2nd argument
DERIV($X*Y^2*Z^3,Z$)
 $3X*Y^2*Z^2$

See: DERIV RISCH

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DESOLVE:
Solves some first-order diff. equations
DESOLVE(dY(X)+Y(X)=X,Y(X))
 $Y(X)=((X-1)*EXP(X)+c...$
See: LDEC

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DIFF:
Differentiation / Integration menu

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

CONSTANTS:
Constants menu
See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

CYCLOTOMIC:
N-th cyclotomic polynomial
CYCLOTOMIC(20)
 $X^8-X^6+X^4-X^2+1$

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DEGREE:
Degree of a polynomial (-1 for 0)
DEGREE($2*X+1$)
 1

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DERVX:
Returns the derivative with respect to the current variable
DERVX(LN((X+1)/(X-1)))
 $-2/(X^2-1)$

See: DERIV INTVX

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DIAGMAP:
Applies a holomorphic operation on a matrix
DIAGMAP([[1,1],[0,2]],EXP(X))
 [[EXP(1) -EXP(1)+EXP(...

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DISTRIB:
Step/step distribution of * and / over + and -
DISTRIB((X+Y)*(Z+1))
 $X*(Z+1)+Y*(Z+1)$

See: FDISTRIB

EXIT ECHO SEE1 SEE2 SEE3 MAIN

DIV:
Divergence of a vector
field
DIV([X+Y^2,Z*Y],[X,Y])
1+Z

See: CURL DERIV
EXIT ECHO SEE1 SEE2 SEE3 MAIN

DIV2MOD:
Euclidean division of
two polynomials with
modular coeffs
DIV2MOD(2X^3,X^2+2)
(2*X -X)

See: DIV2
EXIT ECHO SEE1 SEE2 SEE3 MAIN

DIVMOD:
Divides two poly-
nomials modulo the
current modulus
DIVMOD(2X^2+11,X^2-X)
-(X+1)/(6X)

See: MODSTO
EXIT ECHO SEE1 SEE2 SEE3 MAIN

DOMAIN:
Domain of definition
(does not exclude ra-
tional singularities)
DOMAIN(LN(X))
(-∞ ? 0 + ∞)

See: TABVAR
EXIT ECHO SEE1 SEE2 SEE3 MAIN

EGCD:
Given 2 polynomials A
and B returns U, V :
AU+BV=GCD(A,B)
EGCD(X+1,X-1)
(1 -1 2)

See: ABCUV IEGCD
EXIT ECHO SEE1 SEE2 SEE3 MAIN

EULER:
Returns the number of
integers < n co-prime
with n
EULER(21)

See: 12
EXIT ECHO SEE1 SEE2 SEE3 MAIN

DIV2:
Euclidean division of
two polynomials
DIV2(2X^3,X^2+2)
(2*X -4*X)

See: REMAINDER QUOT ID
EXIT ECHO SEE1 SEE2 SEE3 MAIN

DIVIS:
List of divisors of a
polynomial or integer
DIVIS(6)
(6 3 2 1)

See: FACTOR
EXIT ECHO SEE1 SEE2 SEE3 MAIN

DIVPC:
Returns the increasing
power quotient of 2
polynomials
DIVPC(1+X+X^3,1+X^2,4)
1+X-X^2+X^4

See: TAYLOR0 SERIES
EXIT ECHO SEE1 SEE2 SEE3 MAIN

DROITE:
Equation of a line
given two points
DROITE(1+i,2+3*i)
y=2*(x-1)+1

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

EPSX0:
Replaces objects whose
norm is < EPS by 0
EPSX0(1E-13*X+0.01)
0*X+0.01

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

EXLR:
Splits an equation in
left and right member
EXLR(X=2)
(X 2)

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

EXP&LN:
Exponential and log.
menu

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

EXP2POW:
Rewrite $\exp(a \cdot \ln(b))$
as b^a
EXP2POW(EXP(X*LN(Y)))
Y^X

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

EXPANDMOD:
Expands and simplifies
a polynomial modulo
the current modulus
EXPANDMOD((X^2+5X)*4X)
4X^3-6X^2

See: MODSTO

EXIT ECHO SEE1 SEE2 SEE3 MAIN

FACTOR:
Factorizes an integer
or a polynomial
FACTOR(X^2-2)
(X+√2)(X-√2)

See: EXPAND COLLECT

EXIT ECHO SEE1 SEE2 SEE3 MAIN

FACTORS:
Returns irreducible
factors of an integer
or a polynomial
FACTORS(X^2-1)
(X+1 1. X-1 1.)

See: FACTOR

EXIT ECHO SEE1 SEE2 SEE3 MAIN

FDISTRIB:
Full distribution of *
and / over + and -
FDISTRIB((X+Y)*(Z+1))
Z*X+1*X+Z*Y+1*Y

See: DISTRIB

EXIT ECHO SEE1 SEE2 SEE3 MAIN

EXP2HYP:
EXP -> SINH+COSH
EXP2HYP(EXP(X))
SINH(X)+COSH(X)

See: EXPLN

EXIT ECHO SEE1 SEE2 SEE3 MAIN

EXPAND:
Expands and simplifies
an algebraic expr.
EXPAND((X+2)*(X-2))
X^2-4

See: COLLECT SIMPLIFY

EXIT ECHO SEE1 SEE2 SEE3 MAIN

EXPLN:
Rewrites transcendent.
functions in terms of
EXP and LN
EXPLN(COS(X))
(EXP(i*X)+1/EXP(i*X))...

See: SINCOS EXP2HYP

EXIT ECHO SEE1 SEE2 SEE3 MAIN

FACTORMOD:
Factorizes a poly-
nomial modulo the
current modulus
FACTORMOD(3X^3-5X^2+2)
(3X-3)*(X^2-5X-5)

See: MODSTO

EXIT ECHO SEE1 SEE2 SEE3 MAIN

FCOEF:
Converts list of root
and multiplicity to
corresponding fraction
FCOEF([1,2,4,-1])
(X-1)^2/(X-4)

See: FROOTS

EXIT ECHO SEE1 SEE2 SEE3 MAIN

FOURIER:
N-th Fourier coeff.
of the complex Fourier
series
FOURIER(X^2,0)
4*π^2/3

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN


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ROOTS:
Returns the list of
root/multiplicity of a
fraction
ROOTS((X-Y)^2/(X-1))
      [1 -1 Y 2]
See: FCOEF
EXIT ECHO SEE1 SEE2 SEE3 MAIN

GAMMA:
Gamma function
GAMMA(1/2)
      sqrt(pi)
See: Psi
EXIT ECHO SEE1 SEE2 SEE3 MAIN

GBASIS:
Groebner basis of a
polynomial ideal for
a given order
GBASIS([2*X*Y-Y^2,X^2-
2*X*Y],[X,Y])
See: SOLVE GREDUCE
EXIT ECHO SEE1 SEE2 SEE3 MAIN

GCDMOD:
GCD of 2 polynomials
modulo the current
modulus
GCDMOD(2X^2+5,4X^2-5X)
      -(4X-5)
See: MODSTO GCD
EXIT ECHO SEE1 SEE2 SEE3 MAIN

RAD XYZ HEX R= 'X'      ALG
CHONE C2I INERX
« → P Q
« PREVAL(INTVX(P*Q),
-1,1)
»
CASCH HELP

GREDUCE:
Reduction of a polyno-
mial w.r.t. a Groebner
basis & a given order
GREDUCE(X*Y-1,[X^2-Y^2
,2*Y*X-Y^2,Y^3],[X,Y])
See: SOLVE GBASIS
EXIT ECHO SEE1 SEE2 SEE3 MAIN

GROBADD:
Pastes two grobs,
first over second
See:
EXIT SEE1 SEE2 SEE3 MAIN

FXND:
Splits a fraction to
numerator and denomi-
nator
FXND(1/2)
      ( 1 2 )
See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

GAUSS:
Writes symbolic quad.
form as a sum or diff
of ()^2
GAUSS(X^2+2X*Y,[X,Y])
      ( ... -1,Y^2+(X+Y)^2 )
See: SYLVESTER AXQ QXA
EXIT ECHO SEE1 SEE2 SEE3 MAIN

GCD:
Returns the greatest
common divisor of 2
polynomials | integers
GCD(X^2+2X+1,X^2-1)
      X+1
See: LCM
EXIT ECHO SEE1 SEE2 SEE3 MAIN

GRAMSCHMIDT:
Gram-Schmidt orthonor-
malization/scalar prod-
uct def. by a program
GRAMSCHMIDT([1,X],« →
P Q «PREVAL(INTVX(P*Q)
See: qr
EXIT ECHO SEE1 SEE2 SEE3 MAIN

HADAMARD:
Hadamard matrix prod.
(term by term)
HADAMARD([[1,2],[3,4]]
,[1,2],[3,4]])
      [[1 4] [9 16]]
See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

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<p>HALFTAN: Writes sin,cos,tan in terms of tan of the half angle HALFTAN(SIN(X)) 2*TAN(X/2)/(TAN(X/2)^... See: TAN2SC2 TAN2CS2 EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>HERMITE: Returns the nth degree Hermite polynomial HERMITE(4) 16X^4-48X^2+12 See: TCHEBYCHEFF LEGEN EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>HESS: Hessian of a multivariate function HESS(X^2+2X*Y,[X,Y]) (Hess., Grad., Vars) See: DERIV EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>HILBERT: Square Hilbert matrix of size n HILBERT(2) [[1 1/2] [1/2 1/3]] See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>HORNER: Horner evaluation of a polynomial = the list: {P/(X-a),a,P(a)} HORNER(X^2+1,1) (X+1 1 2) See: PTAYL EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>HYPERBOLIC: Hyperbolic menu See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>IABCUV: Solves au+bv=c for a,b,c integers (returns u,v) IABCUV(15,25,5) (2 -1) See: IEGCD ABCUV EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>IBASIS: Basis of the inter. of 2 vector spaces IBASIS({[1,2]],[2,4]}) ([1 2]) See: BASIS EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>IBERNOULLI: N-th Bernoulli number IBERNOULLI(6) 1/42 See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>IBP: Integration by parts IBP(u*v',v) -> u*v and -u'*v IBP(LN(X),X) (X*LN(X) -1) See: INTVX RISCH PREV EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>ICHINREM: Chinese remainders for integers ICHINREM([2,7],[3,5]) [-12 35] See: CHINREM EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>IDIV2: Euclidean division of two integers IDIV2(35,8) (4 3) See: IREMAINDER IQUOT EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>

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IEGCD:
Given integers a and b
returns u,v so that
au+bv=gcd(a,b)
IEGCD(15,25)
      ( 2 -1 5 )
See: IABCUV EGCD
EXIT ECHO SEE1 SEE2 SEE3 MAIN

IMAGE:
Image of a linear ap-
plication of matrix M
IMAGE([[1,2,3],[4,5,6]
])
      ([[1 0] [0 1])
See: KER BASIS
EXIT ECHO SEE1 SEE2 SEE3 MAIN

INTVX:
Indefinite integral
with respect to the
current variable
INTVX(LN((X+1)/(X-1)))
X*LN((X+1)/(X-1))+LN(...
See: RISCH IBP PREVAL
EXIT ECHO SEE1 SEE2 SEE3 MAIN

IQUOT:
Euclidean quotient of
2 integers
IQUOT(35,8)
      4

See: IREMAINDER IDIV2
EXIT ECHO SEE1 SEE2 SEE3 MAIN

ISOM:
Finds elements of a
2-d or 3-d linear
isometry
ISOM([[0,-1],[1,0]])
      (pi/2 1)
See: MKISOM
EXIT ECHO SEE1 SEE2 SEE3 MAIN

JORDAN:
Diagonalization or
Jordan cycle decomp.
of a matrix
JORDAN([[1,1],[1,1]])
(X^2-2X X^2-2X (0:[1 ...
See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

ILAP:
Inverse Laplace trans-
form of a rational
fraction
ILAP(1/(X^2+1))
      SIN(X)
See: LAP
EXIT ECHO SEE1 SEE2 SEE3 MAIN

INTEGER:
Integer menu
See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

INVMOD:
Performs the inverse
of an integer modulo
the current modulus
INVMOD(5)
      -5
See: MODSTO
EXIT ECHO SEE1 SEE2 SEE3 MAIN

IREMAINDER:
Euclidean remainder of
2 integers
IREMAINDER(35,8)
      3

See: IQUOT IDIV2 REMAI
EXIT ECHO SEE1 SEE2 SEE3 MAIN

ISPRIME?:
Probabilistic pseudo-
primality testing
ISPRIME?(25)
      0.
See: FACTOR
EXIT ECHO SEE1 SEE2 SEE3 MAIN

KER:
Kernel of a linear ap-
plication of matrix M
KER([[1,2,3],[4,5,6]])
      ([-1 2 -1])
See: IMAGE
EXIT ECHO SEE1 SEE2 SEE3 MAIN

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<p>KEYEVAL: Evaluates function associated with keycode KEYEVAL(72.3) (Numeric solver) See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>LAGRANGE: Lagrange polynomial interpolation LAGRANGE([[1,3],[0,1]]) (X-1)/2 See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>LAP: Laplace transform LAP(SIN(X)) 1/(X^2+1) See: ILAP EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>LAPL: Laplacian of a multivariate function LAPL(X^2+2X*Y,[X,Y]) 2 See: DIV EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>LCM: Returns the lowest common multiple of 2 polynomials integers LCM(X^2+2X+1,X^2-1) (X^2+2X+1)*(X-1) See: GCD EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>LCXM: Returns a matrix from row, column numbers & generic coefficient LCXM(1,2,I+2*J) [[1+2*I,1+2*2*I]] See: HILBERT VANDERMON EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>LDEC: Solves a linear diff. equ. given 2nd member and charac. equ. LDEC(2*SIN(X),X^2+1) (cC1+1)SIN(X)+(cC0-X)... See: DESOLVE EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>LEGENDRE: Returns the nth degree Legendre polynomial LEGENDRE(4) (35X^4-30X^2+3)/8 See: TCHEBYCHEFF HERMI EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>LGCD: GCD of a list of objects LGCD((125,75,35)) 5 See: GCD EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>lim: Limit of an expression at a limit point (x=a or x=+/-infinity) LIMIT((EXP(X)-1)/X,0) 1 See: SERIES EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>LIN: Linearization of exponentials LIN(EXP(X)^2) EXP(2*X) See: TEXPAND TLIN EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>LINSOLVE: Solves a system of linear equations LINSOLVE([X+Y=3,X-Y=1],[X,Y]) [X=2 Y=1] See: SOLVE EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>

LNAME:
List of variables in
the object
LNAME(SIN(X)/2*Y)
[X Y]

See: LVAR
EXIT ECHO SEE1 SEE2 SEE3 MAIN

LOCAL:
Creates local variables (can not be SST in algebraic mode)
LOCAL(('+A=1','+B=2'))
('+A=1','+B=2')

See: UNBIND
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MAD:
Adjoint matrix of a matrix (see manuals)
MAD([[1,2],[1,3]])
(1 [[3 -2] [-1 1]]) ([...

See: JORDAN
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MAP:
Executes a program on the elem. of a list
MAP((0,1),« → A «EXP(A)» »)
(1 EXP(1))

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MATR:
Matrix menu

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MKISOM:
Make an isometry given its elements
MKISOM(π ,1)
[[-1,0],[0,-1]]

See: ISOM
EXIT ECHO SEE1 SEE2 SEE3 MAIN

LNCOLLECT:
Collects logarithms
LNCOLLECT(LN(X)+LN(Y))
LN(X*Y)

See: TEXPAND
EXIT ECHO SEE1 SEE2 SEE3 MAIN

LVAR:
List of rational variables in the object
LVAR(SIN(X)/2*Y)
[SIN(X) Y]

See: LNAME
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MAIN:
CAS Main menu

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MATHS:
Maths main menu

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MENUXY:
Menu of CAS commands
MENUXY(2,12)
NOVAL

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MODSTO:
Changes the modulo setting to the specified number
MODSTO(13)
13

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

MODULAR:
Modular menu

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

MULTMOD:
Multiplication of two
polynomials modulo
the current modulus
MULTMOD(11X+5,8X+6)
 -(3X^2-2X-4)

See: MODSTO

EXIT ECHO SEE1 SEE2 SEE3 MAIN

P2C:
Cycles decomposition
of a permutation
P2C((3,2,4,1))
 ((1 3 4) (2))

See: C2P CIRC

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PARTFRAC:
Performs partial frac-
tion decomposition on
a fraction
PARTFRAC(2X^2/(X^2-1))
 2+1/(X-1)-1/(X+1)

See: PROPFRAC

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PLOT:
Plots a function
PLOT(X^2-1)

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PMINI:
Finds minimal poly. of
a matrix by row
reduction
PMINI([[1,0],[0,1]])
 See last non-0 line

See: PCAR JORDAN

EXIT ECHO SEE1 SEE2 SEE3 MAIN

MSLV:
Non-polynomial multi-
variate solver
MSLV('[(SIN(X)+Y,X+SIN(X)
Y)=1]', '[X,Y]', [0,0])
[1.82384112611 -0.9681...

See: SOLVE

EXIT ECHO SEE1 SEE2 SEE3 MAIN

NEXTPRIME:
Next pseudo-prime
after a given integer
NEXTPRIME(8) 11

See: PREVPRIME

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PA2B2:
Writes a prime number
p=1 mod 4 as a square
norm of a complex
PA2B2(5) 2+i

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PCAR:
Characteristic
polynomial of a matrix
PCAR([[1,2],[1,3]])
 X^2-4*X+1

See: PMINI JORDAN

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PLOTADD:
Adds this function to
the list of func. to
plot
PLOTADD(X^2-X)
EQ=(X^2-X,...) in PLO...

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

POLYNOMIAL:
Polynomial menu

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

POP:
Restores flags and
directory
POP

NOVAL

See: PUSH

EXIT ECHO SEE1 SEE2 SEE3 MAIN

POWEXPAND:
Step/step expansion of
powers
POWEXPAND((X+Y)^2)
(X+Y)*(X+Y)

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PREVAL:
Evaluation of an expr.
(anti-derivative) at
the interval bounds
PREVAL(X^2+X,2,3)

6

See: INTVX RISCH IBP

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PROMPTSTO:
Asks for a variable
value, then stores it
PROMPTSTO(A)

NOVAL

See: STORE

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PSI:
N-th derivative of the
digamma function at a
point
PSI(1,3)

(1/15)*π^4

See: Psi

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PUSH:
Saves flags and
directory
PUSH

NOVAL

See: POP

EXIT ECHO SEE1 SEE2 SEE3 MAIN

POTENTIAL:
Find a potential given
a vector field
POTENTIAL([Y,X],[X,Y])
Y*X

See: DERIV VPOTENTIAL

EXIT ECHO SEE1 SEE2 SEE3 MAIN

POWMOD:
Raises a polynomial to
a power modulo the
current modulus
POWMOD(2X+1,4)
3X^4+6X^3-2X^2-5X+1

See: MODSTO

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PREVPRIME:
Previous pseudo-prime
before a given integer
PREVPRIME(9)

7

See: NEXTPRIME

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PROPFAC:
Splits a fraction into
an integer part and a
fraction part
PROPFAC(43/12)

3+7/12

See: PARTFRAC

EXIT ECHO SEE1 SEE2 SEE3 MAIN

PTAYL:
Returns Q : the Taylor
polynomial at x=a of P
(Q(x-a)=P(x))
PTAYL(X^2+2X+1,2)
X^2+6X+9

See: HORNER

EXIT ECHO SEE1 SEE2 SEE3 MAIN

Psi:
Digamma function at a
point: the derivative
of ln(GAMMA(X))
Psi(3.)

.922784335098

See: PSI GAMMA

EXIT ECHO SEE1 SEE2 SEE3 MAIN

QUOT:
Returns the Euclidean
quotient of 2
polynomials
QUOT(X^2+2X+1, X)
 $X+2$
See: REMAINDER DIV2 IQ
EXIT ECHO SEEL SEER SEES MAIN

REF:
Subdiagonal reduction
(Gauss not Gauss-
Jordan)
REF([[1,2],[3,4]])
[[1 2] [0 1]]
See: RREFMOD rref
EXIT ECHO SEEL SEER SEES MAIN

REORDER:
Changes variable
ordering
REORDER(X^2+Y^2, Y)
 Y^2+X^2
See: EXPAND
EXIT ECHO SEEL SEER SEES MAIN

REWRITE:
Rewrite menu

See:
EXIT ECHO SEEL SEER SEES MAIN

RREFMOD:
Modular row reduction
to echelon form (in ex
current modulus=13)
RREFMOD([[1,2],[3,4]])
[[1 0] [0 -2]]
See: REF rref
EXIT ECHO SEEL SEER SEES MAIN

SERIES:
Series expansion at
finite or infinite
points
SERIES(EXP(X), 1, 2)
(Limit:e Equiv:e Exp...
See: TAYLOR lim
EXIT ECHO SEEL SEER SEES MAIN

QXA:
Expresses a quadratic
form in matrix form
QXA($X^2+2X*Y, [X, Y]$)
[[1 1] [1 0]] [X Y]
See: SYLVESTER GAUSS A
EXIT ECHO SEEL SEER SEES MAIN

REMAINDER:
Returns the Euclidean
remainder of 2
polynomials
REMAINDER(X^3-1, X^2-1)
 $X-1$
See: QUOT DIV2 IREMAIN
EXIT ECHO SEEL SEER SEES MAIN

RESULTANT:
Resultant of 2 poly.
Def(Sylvester matrix)
RESULTANT($X^3-Y*X+Z, 3X$
 ^2-Y)
 $-4Y^3+27Z^2$
See:
EXIT ECHO SEEL SEER SEES MAIN

RISCH:
Indefinite integral,
you have to specify a
variable of integrat.
RISCH($X*EXP(X^2+1), X$)
 $EXP(X^2+1)/2$
See: INTVX IBP PREVAL
EXIT ECHO SEEL SEER SEES MAIN

SCROLL:
Switches to graphic
mode and display grob
SCROLL
See:
EXIT ECHO SEEL SEER SEES MAIN

SEVAL:
Simplifies except the
highest rational level
SEVAL(SIN(X+Y)+SIN(Y+X
)
 $SIN(X+Y)+SIN(X+Y)$
See: EXPAND
EXIT ECHO SEEL SEER SEES MAIN

SIGMA:
Discrete antideriva-
tive /specified var
SIGMA(X*X!,X)
X!

See: SIGMAVX
EXIT ECHO SEE1 SEE2 SEE3 MAIN

SEVAL:
Simplifies except the
highest rational level
SEVAL(SIN(X+Y)+SIN(Y+X
)
SIN(X+Y)+SIN(X+Y)

See: EXPAND
EXIT ECHO SEE1 SEE2 SEE3 MAIN

SIMPLIFY:
Attempts to simplify
an expression
SIMPLIFY(SIN(3X)/SIN(X
)
4*COS(X)^2-1

See: EXPAND COLLECT
EXIT ECHO SEE1 SEE2 SEE3 MAIN

SOLVE:
Solves a (or a set of)
polynomial equation
SOLVE(X^4-1=3,X)
(X=√2 X=-√2)

See: LINSOLVE SOLVEVX
EXIT ECHO SEE1 SEE2 SEE3 MAIN

SOLVEVX:
Solves an equation
with respect to the
current variable
SOLVEVX(X^3-1)
X=1

See: SOLVE
EXIT ECHO SEE1 SEE2 SEE3 MAIN

STURM:
Sturm sequences for a
polynomial
STURM(X^3+1)
([1] -1. [X^3+1 -3X^2...

See: STURMAB
EXIT ECHO SEE1 SEE2 SEE3 MAIN

SIGMAVX:
Discrete antideriva-
tive /current var
SIGMAVX(X*X!)
X!

See: SIGMA
EXIT ECHO SEE1 SEE2 SEE3 MAIN

SIMP2:
Simplifies 2 objects
by dividing them by
their GCD
SIMP2(X^3-1,X^2-1)
(X^2+X+1,X+1)

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

SINCOS:
Rewrites complex expo-
nential with trigono-
metric function
SINCOS(EXP(i*X))
COS(X)+i*SIN(X)

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

SOLVER:
Menu of solvers

See:
EXIT ECHO SEE1 SEE2 SEE3 MAIN

STORE:
Algebraic version of
STO
STORE(2+X,Y)
2+X

See: UNASSIGN
EXIT ECHO SEE1 SEE2 SEE3 MAIN

STURMAB:
Sign at low bound and
numb. of zeros between
the bounds of a poly
STURMAB(X^3+2,-2,0)
(-6,1)

See: STURM
EXIT ECHO SEE1 SEE2 SEE3 MAIN

<p>SUBST: Substitutes a value for a variable in an expression SUBST(A^2+1,A=2) 2^2+1</p> <p>See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>SUBTMOD: Subtraction of 2 polynomials modulo the current modulus SUBTMOD(11X+5,8X+6) 3X-1</p> <p>See: MODSTO EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>SYLVESTER: Writes a symmetric matrix as fPDP SYLVESTER([[1,2],[2,3]]) [[1 -1] [[1 2][0 1]]]</p> <p>See: GAUSS EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>SYST2MAT: Converts system of linear equations to a matrix SYST2MAT([X+Y,X-Y=2],[X,Y]) [[1 1 0] [1 -1 -2]]</p> <p>See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>TABVAL: Table of values for a function TABVAL(X^2-1,(1,3)) (X^2-1 ((1 3) (0 8)))</p> <p>See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>TABVAR: Variation table of a function TABVAR(LN(X)/X)</p> <p>See: EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>TAN2CS2: Tan(x) expressed as : (1-cos(2x))/sin(2x) TAN2CS2(TAN(X)) (1-COS(2*X))/SIN(2*X)</p> <p>See: TAN2SC2 TAN2SC HA EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>TAN2SC: Rewrites tan(x) as sin(x)/cos(x) TAN2SC(TAN(X)) SIN(X)/COS(X)</p> <p>See: TAN2SC2 TAN2CS2 EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>TAN2SC2: tan(x) expressed as : sin(2x)/(cos(2x)+1) TAN2SC2(TAN(X)) SIN(2*X)/(COS(2*X)+1)</p> <p>See: TAN2CS2 TAN2SC EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>TAYLOR0: 4th relative order Taylor expansion at 0 TAYLOR0(SIN(X)) X-1/6*X^3+1/120*X^5</p> <p>See: SERIES lim EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>
<p>TCHEBYCHEFF: Returns the nth degree Tchebycheff polynomial TCHEBYCHEFF(4) 8X^4-8X^2+1</p> <p>See: HERMITE LEGENDRE EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>	<p>TCOLLECT: Linearizes and collects sin and cos TCOLLECT(SIN(X)+COS(X)) √2*COS(X-π/4)</p> <p>See: TLIN TEXPAND EXIT ECHO SEE1 SEE2 SEE3 MAIN</p>

TESTS:
Tests menu

See:

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TEXPAND:
Expands transcendental
functions
TEXPAND(EXP(X+Y))
EXP(X)*EXP(Y)

See: LIN TLIN

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TRAN:
Transposes a matrix
(without conjugation)
TRAN([[1,2],[3,4]])
[[1 3] [2 4]]

See:

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TRIGCOS:
Rewrites expression
with cos, if possible
TRIG(SIN(X)^2)
1-COS(X)^2

See: TRIGSIN TRIGTAN T

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TRIGSIN:
Rewrites expression
with sin, if possible
TRIGSIN(COS(X)^2)
1-SIN(X)^2

See: TRIGCOS TRIGTAN T

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TRUNC:
Truncation of an
expansion
TRUNC((1+X+X^2)^3,X^4)
7*X^3+6*X^2+3*X+1

See: DIVPC SERIES

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TEVAL:
Evaluates object and
returns time for eval.
TEVAL(TCOLLECT(SIN(X)+
COS(X)))
(I2*COS(X-PI/4) s: .052...
See:

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TLIN:
Trigonometric linear-
ization
TLIN(SIN(X)^3)
(-SIN(3X)+3*SIN(X))/4

See: TEXPAND TCOLLECT

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TRIG:
Simplifies trig. expr.
using sin^2+cos^2=1
TRIG(SIN(X)^2+COS(X)^2)
)

See: TRIGSIN TRIGCOS $\frac{1}{T}$

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TRIGO:
Trigonometric menu

See:

EXIT **SEE1** **SEE2** **SEE3** **MAIN**

TRIGTAN:
Rewrites expression
with tan, if possible
TRIGTAN(1/COS(X)^2)
TAN(X)^2+1

See: TRIGCOS TRIGSIN T

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

TSIMP:
Decreases the numb. of
rationally depend. var
TSIMP(EXP(2*X)+EXP(X)^
2)
EXP(X)^2+EXP(X)^2

See:

EXIT **ECHO** **SEE1** **SEE2** **SEE3** **MAIN**

UNASSIGN:
Purges variable,
returns its value
UNASSIGN(Y)

2+X

See: STORE

EXIT ECHO SEE1 SEE2 SEE3 MAIN

UNASSUME:
Removes all assump-
tions on a given
variable
UNASSUME(X)

X

See: ASSUME

EXIT ECHO SEE1 SEE2 SEE3 MAIN

UNBIND:
Remove local variables
created by LOCAL
UNBIND
('+A=1','+B=2')

See: LOCAL

EXIT ECHO SEE1 SEE2 SEE3 MAIN

VANDERMONDE:
Returns a Vandermonde
matrix
VANDERMONDE([1,2,3])
[[1 1 1][1 2 4][1 3 9...]

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

VER:
Returns CAS version
number and date of
release
VER
4.20000628

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

VPOTENTIAL:
Find a vector poten-
tial given a field
VPOTENTIAL([1,0,X],[X,
Y,Z]) [0 SQ(X)/2 Y]

See: DERIV POTENTIAL

EXIT ECHO SEE1 SEE2 SEE3 MAIN

XNUM:
Converts integers to
reals
XNUM(1/2)

0.5

See: XQ

EXIT ECHO SEE1 SEE2 SEE3 MAIN

XQ:
Tries to convert
approx. reals to
exact formulas
XQ(0.5)

1/2

See: XNUM

EXIT ECHO SEE1 SEE2 SEE3 MAIN

ZEROS:
Zeros of a polynomial
ZEROS(X^2-4,X)

(2 -2)

See: SOLVE

EXIT ECHO SEE1 SEE2 SEE3 MAIN

∞:
Infinity
∞

∞

See:

EXIT ECHO SEE1 SEE2 SEE3 MAIN

qr:
qr factorization of
matrices M=q*r
qr([[3,5],[4,5]])
([[3/5,4/5],[4/5,-3/5...]

See: GRAMSCHMIDT

EXIT ECHO SEE1 SEE2 SEE3 MAIN

rref:
Row reduction to eche-
lon form and list of
pivots
rref([[A,1],[1,A]])
{Pivots:t-1 1. A^2-1 ...

See: REF RREFMOD

EXIT ECHO SEE1 SEE2 SEE3 MAIN

Functions grouped by subject

While the entries from the CAS HELP facility were listed in alphabetical order in the previous section, it may be more useful to group them by subject for practical applications. The following sections show different subjects of interest including menus, polynomial functions, fraction functions, trigonometric substitutions, exponential and logarithmic substitutions, etc. The function name is followed by the page number in this Document where they appear.

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