

SAS/IML™ Software Reference Card

This Reference Card is a source of quick information that can be detached if desired. Complete descriptions and operating system notes are found in the *SAS/IML User's Guide, Version 5 Edition*.

Operators

Operation	Symbol	Syntax type	Data type
sign reverse	-	prefix	num
addition	+	infix	num
subtraction	-	infix	num
index creation	:	infix	num
matrix multiplication	*	infix	num
element multiplication	#	infix	num
direct product	@	infix	num
matrix power	**	infix	num
element power	##	infix	num
division	/	infix	num
horizontal concatenation		infix	both
vertical concatenation	//	infix	both
element maximum	<>	infix	both
element minimum	><	infix	both
and	&	infix	num
or		infix	num
not	~	prefix	num
less than	<	infix	both
greater than	>	infix	both
equal to	=	infix	both
less or equal	<=	infix	both
greater or equal	>=	infix	both
not equal	~=	infix	both
transpose		postfix	both
subscript	<<,>>	postfix	both

Operator Precedence

Group I (highest priority)

~ subscripts -(prefix) ## **

Group II

* # <> >< / @

Group III

+ -

Group IV

|| // :

Group V

< <= > >= = ~=

Group VI

&

Group VII (lowest priority)

|

Subscript Reduction Operators

+	addition
#	multiplication
<>	maximum
><	minimum
<:>	index of maximum
>:<	index of minimum
:	mean
##	sum of squares

Functions

Function	Example	Arg type
all elements nonzero?	B=ALL(A);	num
any elements nonzero?	I=ANY(A);	num
combine diagonally	C=BLOCK(A,B);	num
bivariate ranks	F=BRANKS(X);	num
numeric to character	C=CHAR(NUM,W,D);	num
element concatenation	C=CONCAT(A,B);	char
convert module to matrix	M=CONVMOD("A");	char
create design matrix	X=DESIGN(A);	num

(continued)

Functions Continued

Function	Example	Arg type
determinant	D=DET(A);	num
diagonal	D=DIAG(A);	num
index generation	I=DO(i1,i2,inc);	num
row-echelon form	M=ECHELON(A);	num
eigenvalues and vectors	CALL EIGEN(M,E,A);	num
eigenvalues	M=EIGVAL(A);	num
eigenvectors	E=EIGVEC(A);	num
finite Fourier transform	B=FFT(A);	num
generalized inverse	G=GINV(A);	num
Gram-Schmidt ortho-normalization	CALL GSORTH(P,T,L,A);	num
Cholesky root	U=HALF(A);	num
Hankel matrix	H=HANKEL(A);	num
horizontal direct product	H=HDIR(A,B);	num
Hermite matrix	H=HERMITE(A);	num
identity matrix	B=I(A);	num
inverse finite Fourier transform	B=IFFT(A);	num
inverse update	B=INVUPDT(A,X,W);	num
iterative proportional fit	CALL IPF(FIT);	num
inverse	I=INV(A);	num
length of longest string	B=LENGTH(A);	char
location of nonzeros	B=LOC(A);	num
matrix of identical values (see REPEAT SHAPE)	B=J(NR,NC,VAL);	num
marginal totals	CALL MARG(LOC);	num
printing attributes	MATTRIB A ROWNAME=R COLNAME=C;	both
maximum value	B=MAX(A);	both
minimum value	B=MIN(A);	both
name of arguments	N=NAME(A,...);	both

(continued)

Functions Continued

Function	Example	Arg type
number of columns	N=NCOL(A);	both
length of element	B=NLENG(A);	both
number or rows	K=NROW(A);	both
character to numeric	N=NUM(A);	char
optimal scaling transformation	OS=OPSCALE(M,QUANTI,QUALIT);	num
orthogonal polynomials	A=ORPOL(X,MD,W);	num
parse matrices	PARSE A B;	char
line printer graphics	CALL PGRAF(XY,ID,XLBL,YLBL,T);	num
product of matrix polynomials	P=PRODUCT(A,B,D);	num
ranking values	R=RANK(A);	num
ranking with ties averaged	R=RANKTIE(X);	num
division of matrix polynomials	R=RATIO(A,M,T,D);	num
repeat values	R=REPEAT(X,NR,NC);	num
Cholesky decomposition	U=ROOT(A);	num
row concatenation	R=ROWCAT(A,B);	char
row concatenation	R=ROWCATC(A,B);	char
reshape	B=SHAPE(A,NROW,NCOL);	both
solve linear system	X=SOLVE(A,C);	num
fit a spline	CALL SPLINE(FITTED,DATA); CALL SPLINEC(FITTED,COEF,ENDVAL,DATA); FITTED=SPLINEV(DATA,COEF);	num
sum of squares	S=SSQ(A);	num
contents of storage	S=STORAGE();	none
substring	A=SUBSTR(B,START,LEN);	char
sum	S=SUM(A);	num
singular value decomp	CALL SVD(U,M,V,A);	num
sweep	B=SWEEP(A,1:5);	num
Toeplitz matrix	T=TOEPLITZ(A);	num
trace	T=TRACE(X);	num

(continued)

Functions Continued

Function	Example	Arg type
pseudo-random uniform deviate	U=UNIFORM(SEED);	num
value assignment	call VALSET(A,B);	char
value lookup	V=VALUE(A);	char
diagonal to vector	V=VECDIAG(A);	num
very accurate multiplication	X=XMULT(Y,Z);	num

Scalar Functions

Function	Usage
absolute value	A=ABS(X);
exponential	B=EXP(X);
integer value (truncation)	I=INT(X);
natural logarithm	Y=LOG(X);
modulo (remainder)	Y=MOD(X,D);
normal random number	N=NORMAL(SEED);
square root	S=SQRT(X);
sine	S=SIN(X);
cosine	S=COS(X);
tangent	S=TAN(X);
arc-sine	S=ARSIN(X);
arc-cosine	S=ARCOS(X);
arc-tangent	S=ATAN(X);
uniform random number	U=UNIFORM(SEED);
normal random number	U=NORMAL(SEED);
normal distribution	P=PROBNORM(X);
inverse normal distribution	P=PROBIT(X);
chi-square distribution	P=PROBCHI(X,DF,NC);
F distribution	P=PROBF(X,NDF,DDF,NC);
t distribution	P=PROBT(X,DF,NC);

Commands

Command	Example
set options	RESET options;
free storage	FREE names;
show status	SHOW items;
print matrices or strings	PRINT names messages;
library store	STORE names;
library retrieve	LOAD names;
module definition start	START name arguments;
module definition finish	FINISH;
module execute	RUN name arguments;

Control Statements

IF-THEN/ELSE
DO-END
iterative DO-END
GOTO
LINK
RETURN

Options

Option	Effect
PRINT	automatically prints all results.
NAME	controls printing of matrix name and default row and column names.
FLOW	traces flow of execution with messages.
DETAILS	causes more details to be shown.
FW=	specifies field width for printing matrices.
STORAGE=	specifies the matrix library storage.

Data Management Commands

DATASETS	shows members in a data library.
CONTENTS	shows variables in a member.
RENAME	renames a SAS data set.
DELETE	deletes (erase) a SAS data set.
USE	opens a SAS data set for read access.
EDIT	opens a SAS data set for read and write access.
CREATE	opens a new SAS data set.
CLOSE	closes a SAS data set or external file.
SETIN	selects an open data set for input.
SETOUT	selects an open data set for output.
SHOW DATASETS	shows data sets currently active.
SHOW CONTENTS	shows contents of current data set.
LIST	displays records.
READ	reads data.
REPLACE	replaces data in data set.
APPEND	adds records at the end of the data set.
FIND	finds records satisfying conditions.
DELETE	marks records as deleted.
FORCE	forces out data to a data set.
PURGE	purges deleted records from SAS data set.

Graphics Commands

GCLEAR	clears the graphics environment.
GDRAW	draws a polyline.
GDRAWL	draws individual lines.
GPIE	draws pie slices.

Graphics Commands Continued

GPOINT	marks points on a graph.
GPOLY	fills a polygon.
GPORT	changes the viewport or screen location of a graph.
GSCALE	determines good numbers to use in scaling.
GSCRIPT	places text on a graph with respect to screen coordinates.
GSHOW	displays the graph.
GSTART	initializes the graphics environment.
GSTOP	unloads the graphics environment.
GTEXT	places horizontal text on a graph relative to data coordinates.
GVTEXT	places vertical text on a graph relative to data coordinates.
GWINDOW	defines a data window for scaling and clipping.
GXAXIS	creates a horizontal axis.
GYAXIS	creates a vertical axis.

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