פקודות ופונקציות ב MATLAB

General Purpose Commands

Operators and Special Characters

+ ,- , *, .*, ^, .^, / , .\, ./, : , ( ), [ ], ., ..., ,,; , %, ', =

\ Backslash .Left-division operator. Solve a system of linear equations.

Commands for Managing a Session

clc Clears Command window.

clear Removes variables from memory.

Special Variables and Constants

ans Most recent answer.

eps Accuracy of floating-point precision.

i,j The imaginary unit $\sqrt{-1}$.

pi The number π

Input/Output Commands

disp Displays contents of an array or string.

Vector, Matrix and Array Commands

Array Commands

find Finds indices of nonzero elements.

```
ind = find(X)
ind = find(X,k)
[row,col] = find(X)
```

length Computers number of elements.

```
numberOfElements = length(array)
```

linspace Creates regularly spaced vector.

```
y = linspace(a,b)
y = linspace(a,b,n)
```

logspace Creates logarithmically spaced vector.

```
y = logspace(a,b)
y = logspace(a,b,n)
```

max Returns largest element.

```
C = max(A)
[C,I] = max(A)
```

min Returns smallest element.

```
C = min(A)
[C,I] = min(A)
```

reshape Change size

```
B = reshape(A,m,n)
```

repmat Replicate and tile array

```
B = repmat(A,m,n)
```

size Computes array size

```
d = size(X)
[m,n] = size(X)
```

sort Sorts each column.

```
B = sort(A)
B = sort(A,dim)
[B,IX] = sort(A)
```

sum Sums each column.

```
B = sum(A)
B = sum(A,dim)
```

sub2ind Convert subscripts to linear indices

```
linearInd = sub2ind(matrixSize, rowSub, colSub)
```

ind2sub Subscripts from linear index

```
[I,J] = ind2sub(siz,IND)
```

numel Number of elements in array or subscripted array expression

```
n = numel(A)
```

Special Matrices

eye Creates an identity matrix.

ones Creates an array of ones.

zeros Creates an array of zeros.

diag Diagonal matrices and diagonals of matrix

Matrix Arithmetic

cross Computes cross products.

```
C = cross(A,B)
C = cross(A,B,dim)
```

dot Computes dot products.

```
C = dot(A,B)
C = dot(A,B,dim)
```

Matrix Commands for Solving Linear Equations

det Computes determinant of an array.

inv Computes inverse of a matrix.

pinv Computes pseudoinverse of a matrix. Solve linear equations in the least-squares sense.

rank Computes rank of a matrix.

trace Sum of diagonal elements.

norm Vector and matrix norms.

Programming

Logical and Relational Operators

== Relational operator: equal to.

~= Relational operator: not equal to.

< Relational operator: less than.

<= Relational operator: less than or equal to.

> Relational operator: greater than.

>= Relational operator: greater than or equal to.

& Logical operator: AND.

| Logical operator: OR.

~ Logical operator: NOT.

xor Logical operator: EXCLUSIVE OR.

Program Flow Control

for Repeats statements a specific number of times

```
FOR variable = drange(colonop)
    statements
end
```

if Executes statements conditionally.

```
if expression
   statements
elseif expression
   statements
else
   statements
end
```

while Repeats statements an indefinite number of times.

```
while expression
   statements
end
```

Mathematical Functions

Exponential and Logarithmic Functions

exp Exponential; ex.
log Natural logarithm; ln(x).
log10 Common (base 10) logarithm; log(x)= log10(x).
sqrt Square root; x.

Trigonometric Functions

cos, cot, csc, sec, sin, tan.
Inverse functions: *acos* , *acot, acsc*, *asec, asin, atan,*

Numeric Functions

ceil Rounds to the nearest integer upward.
floor Rounds to the nearest integer downward.
round Rounds towards the nearest integer.
sign Signum function.
rem Remainder after division
mod Modulus after division

Numerical Methods

Polynomial

eig Computes the eigenvalues of a matrix.

```
d = eig(A)
[V,D] = eig(A)
```

poly Computes polynomial from roots.
roots Computes polynomial roots.

```
r = roots(c)
```

Root Finding and Minimization

fminbnd Find minimum of single-variable function on fixed interval

```
x = fminbnd(fun,x1,x2)
```

fminsearch Find minimum of unconstrained multivariable function using derivative-free method

```
x = fminsearch(fun,x0)
```

fzero Finds zero of single-variable function.

```
x = fzero(fun,x0)
```

Numerical Differentiation Functions

diff Computes the difference between adjacent elements in the vector x.

```
Y = diff(X)
Y = diff(X,n)
Y = diff(X,n,dim)
```

Plotting Commands

Basic xy Plotting Commands

axis Sets axis limits.

```
axis([xmin xmax ymin ymax])
```

grid Displays gridlines.

plot Generates xy plot.

```
plot(Y)
plot(X1,Y1,...,Xn,Yn)
```

figure Opens a new figure window.