a=3

who # variable in scope

whos # show info of a

A = [1,2,3;4,5,6;7,8,9] # matrix of 3X3

[] # zero matrix

ones(4) # full matrix

eye() % identity matrix

rand() % random matrix

randn() % normally distributed random matrix

A = [1:9]’\*[1:9] % multiplication

A(:) % rectirization

A(:,1); A(1,:) % first column or first row

A(1:5,:) % first five rows

A(end-1:end,: ) % the last two rows

[A(6:end,: ); A(1:5,: )] % combine two matrix

A([6:end,1:5),: )

repmat(eye(2),[3,5]) % make copies of eye(2) into 3 by 5

reshape([1:25],[5,5]) % reshape vector into a matrix of 5 by 5

A=eye(3); A(4,4)=3 % fill in 3 with space beyond the previous matrix

A=[1:9]

A’ % transpose

M = A’\*A

P = [0,0,1;0,1,0; 1,0,0]; inv(P),P^-1 % inverse the same

P^2 % matrix square

A = rand([3,5]), B=pinv(A); A\*B % pseudo inverse matrix

Cond(A)

det(A) % determinants

A=[2,1;3,1]; B = [7,9]’

Inv(A)\*B; A\B % same calculation

A=[1,2,3;4,5,6;7,8,9]

A .\* B % element-wise operation

A .^2 % element-wise square

A ./ 2; A/2

[1:10] ./ [10:-1:1]

A = reshape ([1:25],5,5)

min(A); max(A);

sum(A) % sum for all rows

sum(A,2) % sum for all columns

A = rand(3)

Mask = A<0 % boolean results

A(mask) % find values for conditional result

a=3

if 1<2

disp(‘smaller’)

else

disp(‘bigger’)

end

Switch a

Case 1

Disp(‘one’)

Case 2

Disp(‘two’)

Otherwise

Disp(‘help’)

for i = [10:-2;0]

disp(i)

end

X=1/101

format long % not the real number

X

V=linspace(0,1,101); v(101)-1 % prevent numeric errors

N = 1000

X = linspace(0,1,N)

Y2 = 1 ./(1+x .^2)

4\*sum(y2/N)

y1 = 1 ./ (1+x)

A = [4,2,8,5,7,1]

sort(A)

unique ([1,2,2,3,3,2,1]) % find unique values without repeated ones

find(A) % list non-zero elements

find(A==8) % search the

Matrix factorization, ~ operator

A=rand(3)

Lambda = eig(A)

[v,lambda] = eig(A) % eigen decomposition

[v,~] = eig(A) % only compute eigen values

Memory control

Who

Whos

Load % load matrix from the file

Save % save certain file or matrix (save v.mat v)

Clear

Sparse matrix

Sparse() % 0 into null

Zeros()

Full() % turn sparse matrix into full version

Spy() % show matrix on the axis

X=[1:10] .^2

Dx= x(2:end)- x(1:end-1); Dx = diff(X) % the same

A = eye(3); diff(A) % subtract rows

Function y = mysine(x) % in the file of mysine.m; save the file as “mysine”

Y=sin(x)

End

Mysine(pi)

x=linspace(0,pi,30)

plot(x,x,’x’) % A scatter plot, ‘x’ being notation

Plot(x,sin(x),’-’) % linear plotting

Plot(x,sin(x),’or’,x,cos(x),’+b’) % ‘o’ in red and ‘+’ in blue

Legend(‘sin’,’cos’) % name function in sequence

Polarplot(x,sin(x),’or’)

Semilogx(x,x) % log on x-axis, or on y-axis

Loglog(x,x,’x’)

X=randn(100,1)

Hist(x,10) % 10 bars on histogram or automatic on default

Binrange = -4:4

[bincounts] = histc(x,binrange) % histogram counts

Bar(x,y,hist)

[X,Y] = meshgrid(-8:.5;8)

R = sqrt(x.^2+Y.^2)+eps

Z=sin(R)./R

Mesh(Z)

Mesh(X,Y,Z)

[C,h]=contour(Z);clabel(C,h)

Contour(X,Y,Z)

Title(‘Test^a^bTitle\_1\_2\_3’); % superscript and subscript

Figure(1); plot1

Figure(2); plot2

Hold on; hold off % keep the current graph in the figure

Subplot(2,2,1); plot1-4 % separate 2x2 layout for 4 graphs

Subplot(1,2,2) %

Loading/saving data

Imread(‘image.jpg’)

Imshow(‘image.jpg’)

Contour(pic(:,:,1));axis equal % row column ratio maintained

tic;pause;toc % record time between tic and toc

Sqr=@(x)(x.^2) % variable as a function handle sqr is the function of x^2

Sqr(10)

Quad(y2,0,1) % integral(y2,0,1) in matlab

F = @(x) (x-3)^2+1

[x,y] = fminsearch(f,1) % search minimum solve for y=1

G=@(x)cos(x)-x

Fsolve(g,0.7)

Matlab Toolbox

Sym(‘x’)