Matlab Programming Help

Online Help:

1. http://www.mathworks.com/academia/student_center/tutorials/launchpad.html

2. http://www.math.ufl.edu/help/matlab-tutorial/

3. http://www.ag.unr.edu/moeltner/Matlab%20Tutorial/Matlab%20Tutorial.pdf

Programming Basic

1. Input and output statement: output is written first.

Example 1:

X = Y + 1

Define X as Y+1.

X can be a scalar, vector, matrix. To do so, you have to define it first. For scalar case, you don't need to do so.

Code	Meaning
Y=1	Variable Y is defined as 1
Y=1+Y	Variable Y is defined as 1 + 1, so that Y becomes 2
X=Y+1	Variable X is defined as 2 + 1
Y = zeros(1,2)	Y becomes a 1x2 null vector. Y = (0, 0)
Y(1,1) =1 Y(1,2) =2	Y = (1,2)

2. Do Loop

Suppose that you want to add the sequence of numbers. Let's program this.

Ex2. X = 1 + 2 + 3 + 4 + 5 + ... + 10

Sol 1: Write as

X =1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10

Sol 2: Write as

X = 1

X = X + 2

X = X + 3

...

X = X + 10

Sol 3: Use "For" statement

X = 0; For i = 1:10; X = X + i; End;	Assign 1 to X. Need ";" to continue program it. Start Do loop. First assign i to be 1, and increase it by 1 up to 10. X becomes X + i, Repeat this until i = 10

Let X = [1 3 4 2 2 2 4 1 23 5]; That is, X is a 10x1 vector. Calculate its mean by using For statement

Z = 0; For i = 1:10; Z = Z + X(i); End;	Assign 1 to Z. Start Do loop. First assign i to be 1, and increase it by 1 up to 10. Z becomes Z + X(i), Repeat this until i = 10

Exercise: For Statement

1. Add 1 through 100

2. Multiply 1 through 20

3. 2 x 4 x 6 x 8 x ... x 20

4. X(1)xY(1) + X(2)xY(2) + ... + X(n)xY(n)

3. IF Statement

Format:

IF condition statement End

Example: X = [1 -2 3 -4]

We want to change X to index such that Y = 0 if X >0, Y=1 o.w.

Y = X;

For i = 1:4;

  if X(i) > 0; Y(i) = 0; end;

  if X(i) < 0; Y(i) = 1; end;

end;

Exercise: IF Statement

1. X = [1 3 4 8]. Find the maximum of X.

2. Find the minimum of X

3. Sort X.

4. Data (Matrix & Vector) Modification

Ex: A = [1 2; 3 4] implies A = 1 2
                                3 4
Type the following commends.
   1. A'
   2. sum(A)
   3. sum(A')
   4. sum(A')'
   5. diag(A)
   6. sum(diag(A))
   7. inv(A)
   8. A(1,2)
   9. A(1,1)
   10. A(2,1)
   11. A(:,1)
   12. A(1,:)
   13. A(:)
   14. A(:,end)

Expression

.*   element by element product
./   element by element division
\   inverse
.^   element by element power

Type A = [1 2; 3 4]; B = [1 1; 2 3];

   1. a
   2. A
   3. b
   4. B
   5. A.*B
   6. A./B
   7. A\B
   8. Inv(A)*B
   9. A'*A
   10. B'*B
   11. Inv(A).*A
   12. Inv(A)*A

Ex b = [2 3]. You want to calculate A – b = 1-2 2-3
                                           3-2 4-3

Important Functions

Type A = [-3 4; 1 3;2 2]
   1. a
   2. A
   3. mean(A)

```
4. sum(A)
5. sort(A)
6. [B,id] = sort(A)
7. max(A)
8. min(A)
9. std(A)
10.  var(A)
11.  cov(A)
12.  abs(A)
```

5. Function Statement

Format

Function output = functionname(inputs)

Example: Average

Function y = mymean(x)

t = length(x);

y = 0;

for i = 1:t;

y = y + x(i);

end;

Then in the main program, you can recall `mymean'.

z = mymean(x);

In Fortran, this function statement is called as `subroutine' program.

In Gauss, it is called as `proc' program.

Matlab library contains many function statements.

Assignment 1: Download X and Y variables from the class homepage.

A. Sort X from smallest to largest

B. Sort Y from largest to smallest

C. Calculate mean and variance of X and Y.

D. Calculate correlation between X and Y

E. Make functions (mymean, myvar, mycorr) and use them to calculate C,D and E.

F. Program OLS function.

Input = x and y. both them are Tx1 vectors.

Regression: y = bx + u.

output:

b = inv(x'x)*x'y

R^2,

ordinary t-value.

Function [b,r2,tb] = myols(y,x)