

## Feedback Control system HW1 108060019 吳至凌

### 1. Basic Arithmetic

MATLAB code :

```
1  clc
2  clear all
3  x = [2 1+2i ;
4      -0.45 5]
5  I = [1 0 ;
6      0 1]
7  z1 = log(x + sqrt( 1 + x^2 )) / 2 + I
```

Result :

z1 =

```
1.7114 - 0.0253i    0.8968 + 0.3658i
0.2139 + 0.9343i    2.1541 - 0.0044i
```

### 2. Matrix / Vector

MATLAB code :

```
1  clc
2  clear all
3  A = [12 34 -4;
4      34 7 87;
5      3 65 7]
6  B = [1 4 7;
7      2 5 8;
8      3 6 9]
9  z2 = A * B
10 z3 = A .* B
11 z4 = A ^ 3
12 z5 = A .^ 3
13 z6 = [A([1,3],:);B^2]
14 z7 = eig(B)
15 z8 = det(A)
16
```

Results :

z2 =

68	194	320
309	693	1077
154	379	604

z3 =

12	136	-28
68	35	696
9	390	63

z4 =

37226	233824	48604
247370	149188	600766
78688	454142	118820

z5 =

1728	39304	-64
39304	343	658503
27	274625	343

z6 =

12	34	-4
3	65	7
30	66	102
36	81	126
42	96	150

z7 =

16.1168  
-1.1168  
-0.0000

z8 =

-75246

### 3. Equation solving

MATLAB code :

```
1  clc
2  clear all
3  A = [1/2 1/3 1/4;
4       1/3 1/4 1/5;
5       1/4 1/5 1/6]
6  B1 = [0.95;
7        0.67;
8        0.52]
9
10 B2 = [0.95;
11        0.67;
12        0.53]
13
14 X1 = A\B1
15 X2 = A\B2
16
17 x1_B1 = X1(1,1)
18 x2_B1 = X1(2,1)
19 x3_B1 = X1(3,1)
20
21 x1_B2 = X2(1,1)
22 x2_B2 = X2(2,1)
23 x3_B2 = X2(3,1)
```

Results :

a. Answer for 0.52

x1\_B1 =

1.2000

x2\_B1 =

0.6000

x3\_B1 =

0.6000

b. Answer for 0.53

x1\_B2 =

3.0000

x2\_B2 =

-6.6000

x3\_B2 =

6.6000

#### 4. Loop statement

MATLAB code :

```
1  clc
2  clear all
3
4  H = zeros(9,9)
5  for i = 1 : 9
6      for j = 1 : 9
7          H(i, j) = 1 / (i + j - 1)
8      end
9  end
```

Result :

H =

1.0000	0.5000	0.3333	0.2500	0.2000	0.1667	0.1429	0.1250	0.1111
0.5000	0.3333	0.2500	0.2000	0.1667	0.1429	0.1250	0.1111	0.1000
0.3333	0.2500	0.2000	0.1667	0.1429	0.1250	0.1111	0.1000	0.0909
0.2500	0.2000	0.1667	0.1429	0.1250	0.1111	0.1000	0.0909	0.0833
0.2000	0.1667	0.1429	0.1250	0.1111	0.1000	0.0909	0.0833	0.0769
0.1667	0.1429	0.1250	0.1111	0.1000	0.0909	0.0833	0.0769	0.0714
0.1429	0.1250	0.1111	0.1000	0.0909	0.0833	0.0769	0.0714	0.0667
0.1250	0.1111	0.1000	0.0909	0.0833	0.0769	0.0714	0.0667	0.0625
0.1111	0.1000	0.0909	0.0833	0.0769	0.0714	0.0667	0.0625	0.0588

## 5. Plot

MATLAB code :

```
1  clc
2  clear all
3  subplot (1,2,1)
4  fplot (@(x) -sqrt(cos(x)) + 3, [-pi/2, pi/2])
5  title('-sqrt(cos(x))+3');
6  xlabel('x');
7
8  subplot(1,2,2)
9  X = [-2:0.01:2]
10 Y = [-4:0.01:4]
11 [x, y] = meshgrid(X, Y)
12 f = (x.^2/(2^2)) - (y.^2/(4^2))
13 contour(x,y,f)
14 title('x^2/(2^2) - y^2/(4^2)');
15 xlabel('x');
16 ylabel('y');
```

Result plot :

