Lab 1 - Introduction to MATLAB

Task 1 - Enter a matrix A of size 5*5 with all entries non zero of your choice.

```
A = round(rand(5,5).*100, 1)
```

```
A = 5×5
   81.5000    9.8000   15.8000   14.2000   65.6000
   90.6000   27.8000   97.1000   42.2000    3.6000
   12.7000   54.7000   95.7000   91.6000   84.9000
   91.3000   95.8000   48.5000   79.2000   93.4000
   63.2000   96.5000   80.0000   95.9000   67.9000
```

a - Get the matrix transpose.

```
 A_transpose = A'
```

```
A_transpose = 5×5
   81.5000   90.6000   12.7000   91.3000   63.2000
    9.8000   27.8000   54.7000   95.8000   96.5000
   15.8000   97.1000   95.7000   48.5000   80.0000
   14.2000   42.2000   91.6000   79.2000   95.9000
   65.6000    3.6000   84.9000   93.4000   67.9000
```

b - Divide by 2 (elementwise)

```
A_div = A./2
```

```
A_div = 5×5
   40.7500    4.9000    7.9000    7.1000   32.8000
   45.3000   13.9000   48.5500   21.1000    1.8000
    6.3500   27.3500   47.8500   45.8000   42.4500
   45.6500   47.9000   24.2500   39.6000   46.7000
   31.6000   48.2500   40.0000   47.9500   33.9500
```

c - Determinant

```
A_det = det(A)
```

```
A_det = -2.4644e+08
```

d - Get inverse of A

```
A_inverse = inv(A)
```

```
A_inverse = 5×5
    0.0318   -0.0083   -0.0190   -0.0429    0.0526
   -0.0871    0.0358    0.0295    0.1390   -0.1458
   -0.0638    0.0377    0.0367    0.1019   -0.1263
    0.1382   -0.0698   -0.0650   -0.2388    0.2800
   -0.0258    0.0110    0.0245    0.0597   -0.0737
```

e - Get second column of A

```
sec_col = A(:, 2)
```

```
sec_col = 5×1
    9.8000
   27.8000
   54.7000
   95.8000
   96.5000
```

f - Get 4th row of A

```
fourth_row = A(4, :)
```

```
fourth_row = 1×5
   91.3000   95.8000   48.5000   79.2000   93.4000
```

Task 2 - z = [0.9347,0.3835,0.5194,0.8310]

```
z = [0.9347,0.3835,0.5194,0.8310]
```

```
z = 1×4
    0.9347    0.3835    0.5194    0.8310
```

```
minimum = min(z)
```

```
minimum = 0.3835
```

```
sorted = sort(z)
```

```
sorted = 1×4
    0.3835    0.5194    0.8310    0.9347
```

```
s = sum(z)
```

```
s = 2.6686
```

```
mean_z = mean(z)
```

```
mean_z = 0.6672
```

Task 3 - Run the following commands

```
eye(4,4)
```

```
ans = 4×4
     1     0     0     0
     0     1     0     0
     0     0     1     0
     0     0     0     1
```

```
zeros(2,3)
```

```
ans = 2×3
     0     0     0
     0     0     0
```

```
ones(2)
```

```
ans = 2×2
     1     1
     1     1
```

Define matrix A

```
A = [9,7,0;0,8,6;7,1,-6]
```

```
A = 3×3
     9     7     0
     0     8     6
     7     1    -6
```

```
size(A)
```

```
ans = 1×2
     3     3
```

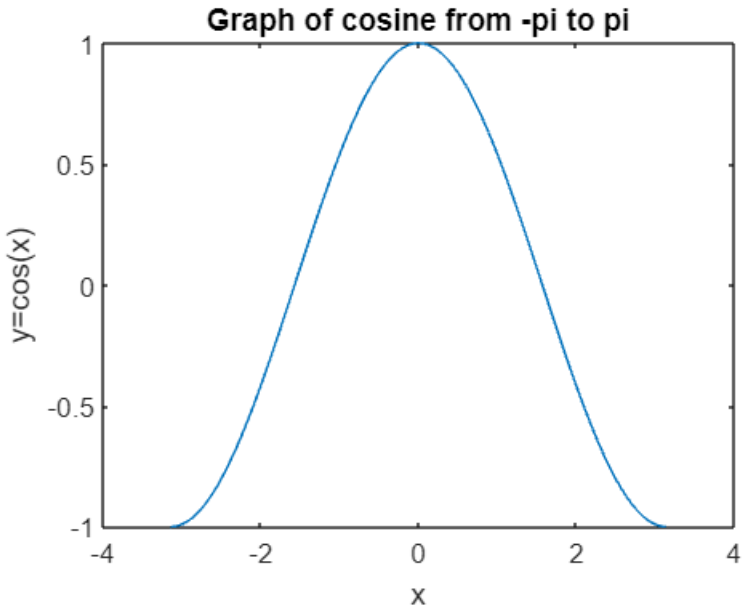
```
det(A)
```

```
ans = -192
```

```
inv(A)
```

```
ans = 3×3
    0.2812   -0.2187   -0.2187
   -0.2188    0.2812    0.2812
    0.2917   -0.2083   -0.3750
```

```
x=-pi:0.01:pi;
y=cos(x);
plot(x,y)
xlabel('x')
ylabel('y=cos(x)')
title('Graph of cosine from -pi to pi')
```



Task 4 - We have the following two matrices (2 Marks)

B = [2 2 3; 4 0 6; 8 1 5]

C = [1 1 2; 6 3 5; 1 9 1]

```
B = [2 2 3; 4 0 6; 8 1 5];
C = [1 1 2; 6 3 5; 1 9 1];
```

Calculate:

```
D = B - C
```

```
D = 3×3
     1     1     1
    -2    -3     1
     7    -8     4
```

```
E = B + C
```

```
E = 3×3
     3     3     5
    10     3    11
     9    10     6
```

```
F = E + 2
```

```
F = 3×3
     5     5     7
    12     5    13
    11    12     8
```

```
G = B * C
```

```
G = 3×3
    17    35    17
    10    58    14
    19    56    26
```

```
H = B.*C
```

```
H = 3×3
     2     2     6
    24     0    30
     8     9     5
```

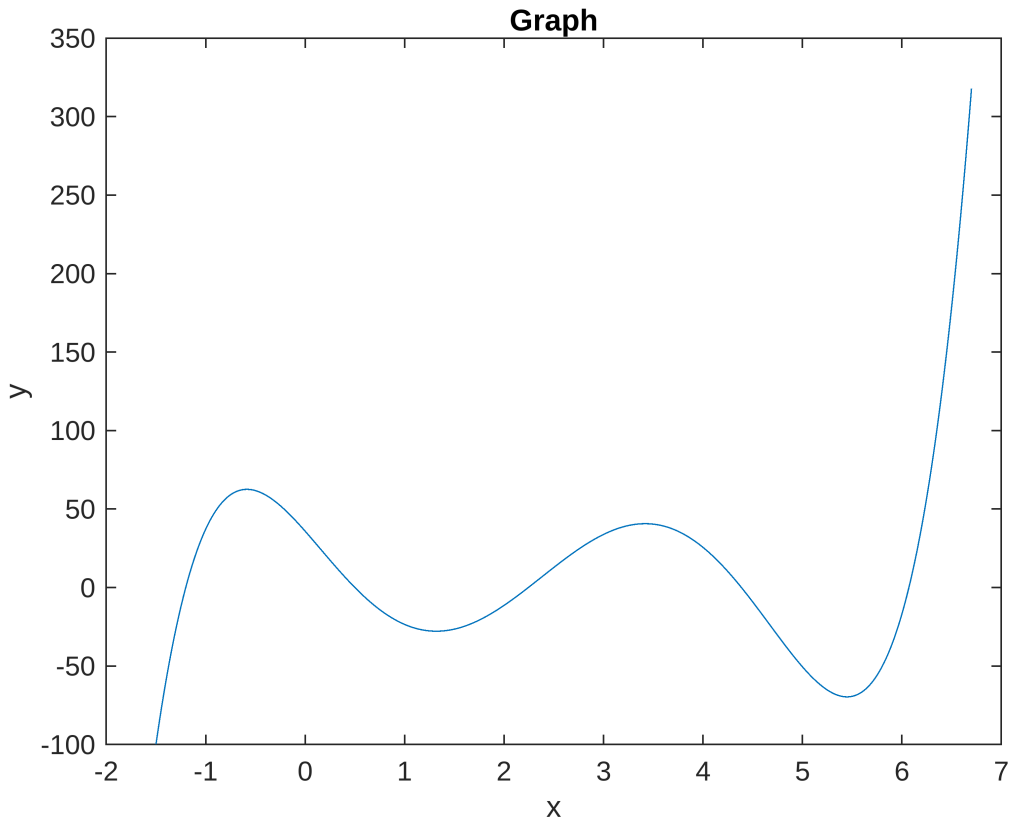
Task 5 - Solving polynomials

```
x = -1.5:0.01:6.7;
y = x.^5 - 12.*(x.^4) + 40.59.*(x.^3) - (17.015).*(x.^2) - 71.95.*x + 35.88
```

```
y = 1×821
  -99.8137  -95.4493  -91.1630  -86.9543  -82.8222  -78.7660  -74.7849  -70.8781 ···
```

```
plot(x,y)
xlabel('x')
ylabel('y')
```

```
title('Graph')
```



Finding roots

```
coefficients = [1, -12, 40.59, -17.015, -71.95, 35.88];
roots = roots(coefficients);
disp(roots);
```

```
    6.0705
    4.3867
    2.2436
   -1.2009
    0.5001
```