Pre-lab 3 Matlab Refresher
MIE301 – 2023

Your Practical TA will guide you through this pre-lab training. The purpose of your pre-lab is to:

- Learn how to update 2 dimensional vectors using inner and outer loops.
- Learn to use find() function to extract specific elements and their indices.

The pre-lab will be briefly reviewed at the beginning of the PRA session and there are no deliverables associated.

Getting Started:

1. Open Matlab. You can access Matlab from any ECF computer to complete assignments or for use in group projects. You can even log in remotely from any computer!

Steps: (the TA will guide you through these steps at the beginning of the Practical)

1. Two dimensional vectors using Inner & Outer loops.

Goal: plot 3 concentric circles with different radiuses

Create a 1x3 vector containing 3 different radius values:

```
radius = linspace(1,3,3);
```

Create a 1x10 vector containing angle vector covering 0 to 360 degrees:

```
theta = linspace(0,2*pi,10);
```

Define inner loop to cycle through angle vector and an outer loop to cycle through radiuses:

```
for j=1:length(radius)
    for i=1:length(theta)
        Cx(i,j) = radius(j)*cos(theta(i));
        Cy(i,j) = radius(j)*sin(theta(i));
    end
end
```

Cx and Cy are now ready;

Cx is a 10x3 matrix where its jth column, stores the x-coordinates of the jth circle and each row corresponds to a specific theta(i) angle.

You may use plot() and hold on functions to plot them:

```
for j=1:length(radius)
    for i=1:length(theta)
        Cx(i,j) = radius(j)*cos(theta(i));
        Cy(i,j) = radius(j)*sin(theta(i));
    end
    plot(Cx(:,j), Cy(:,j))
```

```
    hold on
end
```

2. How to use “find()”.

Goal: plot a sinusoidal signal, and mark its negative region

Create an angle vector and consequently the sinusoidal signal:

```
theta = 0:0.2:2*pi;
signal = sin(theta);
```

Use find() function to find the index corresponding to the first time that signal goes bellow 0:

```
indF = find(signal<0, 1, 'first');
```

Use find() function to find the index corresponding to the last time that signal is still negative:

```
indL = find(signal<0, 1, 'last');
```

Plot the negative region in red and the original signal on top of it in black:

```
for i=1:length(theta)
plot( theta(indF:indL), signal(indF:indL), 'r','linewidth',4);
hold on
plot( theta(:), signal(:),'.-k','linewidth',1);
end
```

3. Use max() or min() function to find the max/min value in an array

```
r1 = rand(10,1)
[M,I]=max(r1)
[M,I]=min(r1)
```