

ECE 257 - LESSON 3 - INTRODUCTION TO TWO-DIMENSIONAL PLOTTING - PART I

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IN CLASS

In the last Lesson we showed how to do vectorized calculations. In this Lesson we introduce how to plot the results of our vectorized calculations.

GRAPHS PLOTTED ON A LINEAR SCALE

1. Connecting the points

```
x = [0 1 2];  
y = [0 1 0];  
plot(x, y)
```

- Describe what *plot* is doing
- How is the length of *x* related to the length of *y*

2. Some more connecting of points

```
x = [0 1 1 2 1];  
y = [0 1 2 1 1];  
plot(x, y)
```

- How is this plot different from *functions* we plot in math class

3. Plotting a line

```
x = 0: 0.2: 2;  
y = 3*x + 2;  
plot(x, y)
```

- Describe what Matlab is doing in this program

4. Trying to plot a sinusoid

```
x = 0: 0.2: 2;  
y = cos(2*pi*x);  
plot(x, y)
```

- What went wrong in this program
- How would you fix this program

5. Correctly plotting a sinusoid

```
x = 0: 0.01: 2;  
y = cos(2*pi*x);  
plot(x, y)
```

- Why are these instructions for plotting this cosine better than the previous one

6. Plotting a more general sinusoid

```
f = 10;  
T = 1/f;  
x = 0: T/100: 2*T;  
y = cos(2*pi*f*x);  
plot(x, y)
```

- a. What's the advantage of writing our plotting program this way

7. The `linspace` command

```
f = 10;  
T = 1/f;  
x = linspace (0, 2*T, 100);  
y = cos (2*pi*f*x);  
plot (x, y)
```

- a. What does the instruction *linspace* do
- b. What is the distance between successive values of x

8. Plotting a higher frequency sinusoid

```
f = 1000;  
T = 1/f;  
x = linspace (0, 2*T, 100);  
y = cos (2*pi*f*x);  
plot (x, y)
```

- a. What is the distance between successive values of x

9. Adding a grid to the graph

```
x = linspace (0, 2, 100);  
y = cos (2*pi*x);  
plot (x, y)  
grid on
```

- a. What does *grid on* do

10. Adding labels and titles to a graph

```
x = linspace (0, 2, 100);  
y = cos (2*pi*x);  
plot (x, y);  
grid on;  
xlabel ('x');  
ylabel ('y');  
title ('y as a function of x');
```

- a. What do *xlabel* and *ylabel* do
- b. What does *title* do

11. Changing the scaling of the axis

```
x = linspace (0, 2, 100);  
y = cos (2*pi*x);  
plot (x, y);  
grid on;  
xlabel ('x');  
ylabel ('y');  
title ('y as a function of x');  
xlim ([-0.5 2.5]);  
ylim ([-1.5 1.5]);
```

- a. What do *xlim* and *ylim* do

12. Specifying the color of a graph

```
x = linspace (0, 2, 100);  
y = cos (2*pi*x);  
plot (x, y, 'r');
```

- a. What's the affect of adding 'r' in the plot instruction

13. Specifying the line type of a graph

```
x = linspace (0, 2, 100);  
y = cos (2*pi*x);  
plot (x, y, 'g--')
```

- a. What's the affect of adding the dashed lines in the plot instruction

14. Plotting of individual points

```
x = 0: 0.2: 2;  
y = 3*x + 2;  
plot (x, y, '*')
```

- a. What's the affect of adding the asterisk in the plot instruction

15. Stem plot

```
x = 0: 0.2: 2;  
y = 3*x + 2;  
stem (x, y);
```

- a. What does the *stem* instruction do

16. Staircase plots

```
x = 0: 0.2: 2;  
y = 3*x + 2;  
stairs (x, y);
```

- a. What does the *stairs* instruction do