

MTH229

Plotting Graphs in MATLAB

Project 2– Exercises

NAME: _____
SECTION: _____
INSTRUCTOR: _____

Exercise 1:

Create a graph of $y = \cos 4x$ over $[0, \pi]$. To illustrate what happens when there are too few points in your domain, first try a step size of $\pi/10$ ($\text{pi}/10$).

- a. Which command gives the desired values for x ?
(1) Circle one:
 - 1. `x=0:pi/10:pi`
 - 2. `x=0:pi:pi/10`
 - 3. `x=linspace(0,pi)`

- b. Which command gives the correct answer for y ?
(2) Circle one:
 - 1. `y = cos(4x)`
 - 2. `y = cos4*x`
 - 3. `y = cos(4*x)`

- c. Plot your graph with the `plot` command. You don't need to turn it in.

- d. Redo your plot, this time using the command `>>x=linspace(0,pi)` to define the x array. Which plot looks more like the plot of a cosine curve?
(3) Circle one:
 - 1. The first one
 - 2. the second one
 - 3. both of them

Exercise 2:

We wish to plot the function $f(x) = e^{\cos(x)}$ over the interval $[0, 2\pi]$.

- a. What command generates a sufficient number of values for x ?
- (4) Circle one:
1. `linspace(0,2*pi)`
 2. `linspace(0,100,2*pi)`
 3. `0:2*pi`
 4. `0:2*pi:0.01`
- b. Which command will generate the corresponding y values:
- (5) Circle one:
1. `exp^cos(x)`
 2. `e^cos(x)`
 3. `exp(cos(x))`
 4. `exp(x)cos(x)`

Exercise 3:

Define a , b and c by

```
>> a = 1:2:20; b = 1:10; c = 1:2:10;
```

Which of the following is defined?

- a. `b+c`
- (6) Circle one:
1. yes 2. no
- b. `a + b`
- (7) Circle one:
1. yes 2. no
- c. `a./ b`
- (8) Circle one:
1. yes 2. no
- d. `a * b`
- (9) Circle one:
1. yes 2. no

Exercise 4:

Let $\mathbf{x}=[1\ 2\ 3]$. Translate the following math statements into MATLAB commands. To help, the value for the function when $\mathbf{x}=[1\ 2\ 3]$ is given in parentheses.

- a. Write MATLAB commands to compute:

$$\cos(x)\sin(x)$$

```
ans =  
0.4546 -0.3784 -0.1397
```

(10)

- b. Write MATLAB commands to compute:

$$\sin(x)^2$$

```
ans =  
0.7081 0.8268 0.0199
```

(11)

- c. Write MATLAB commands to compute:

$$\sin(x^2)$$

```
ans =  
0.8415 -0.7568 0.4121
```

(12)

d. Write MATLAB commands to compute:

$$f(x) = 7x^2 \sin\left(\frac{1}{7x^2}\right)$$

```
ans =  
    0.9966    0.9998    1.0000
```

(13)

e. Write MATLAB commands to compute:

$$f(x) = x - \frac{\cos(x) - \sin(x)}{\sin(x) + \cos(x)}$$

```
ans =  
    1.2180    4.6877    1.6675
```

(14)

f. Write MATLAB commands to compute:

$$f(x) = \frac{1}{10} \left(x - \frac{x^{3/2}}{10}\right)^2$$

```
ans =  
    0.0810    0.2949    0.6152
```

(15)

Exercise 5:

Graph the function $f(x) = \sin((\pi/2)x) + \sin((2/5)\pi x)$ over the interval $[0, 40]$.

- a. How many peaks (*relative maxima*) does the graph have?

(16) Answer: _____

- b. This function is periodic. How many periods are graphed in $[0, 40]$?

(17) Circle one:

1. 2

2. 3

3. 4

4. 5

5. none of the above

- c. Estimate from your graph the value of $f(10)$ to at least 1 decimal point.

(18) Answer: _____

- d. Upload your graph.

(19) Attach your graph to the worksheet.

Exercise 6:

- a. Graph the function $f(x) = \cos^2(x) - \sin^2(x)$ over the interval $[-2\pi, 2\pi]$. Use 100 points in the domain. **(20) Attach your graph to the worksheet.**

- b. Does the graph resemble any graph that you are familiar with?

(21) Circle one:

1. $\cos 2x$

2. $\cos x/2$

3. $\cos x$

Exercise 7:

For this exercise we look at the graph of the polynomial function $f(x) = x^3 - 20x^2 + 10x - 1$.

- a. First plot the function over the interval $[-10, 10]$. What is the approximate range for the y -axis?

(22) Circle one:

1. $[-10, 10]$
2. $(-10, 10)$
3. $[-3100, 0]$
4. $[0, 2\pi]$

- b. We wish to investigate when (if) this function is positive. We can't readily tell from our graph so we will replot over a smaller domain. Which of these domains seems appropriate for this task?

(23) Circle one:

1. $[0, 500]$
2. $[0, 10]$
3. $[-1, 1]$
4. $[0, 2\pi]$

- c. Replot the graph over the selected domain. Turn on the grid by entering the command

```
>> grid
```

From your graph, which of these x values have $f(x) > 0$?

(24) Circle all that apply:

1. 0
2. 0.25
3. 0.50
4. 0.75