EE322 Fall 2012: Lesson 2/PS02 (Worksheet)

Introduction to MATLAB, Chapter 2: Getting Started with MATLAB.

Introduction

In this assignment, you will become more familiar with the functions that are available in MATLAB. Later in the course, you will find that in many cases, it will be necessary to write your own functions to suit your own needs.

I. Section 2.1

Run through the series of commands on pages 18-23. Note that when you create a plot, it is usually a good idea to plot pairs of values; that is, each x value has an associated y value. When you get to the plot command on page 23, it is actually plotting 5 pairs of values: (1,10), (2,20), (3,30), (4,40) and (5,50). The x-vector has the x coordinates; the y-vector holds the y coordinates.

1. After you use the plot command, it is common to label the axes. Run the following commands to label your axes:

   `xlabel('x-values')`

   `ylabel('y-values')`

   `title('x-y plot')`

2. Close your plot window. Create a new m-file called "ps02.m". Put all of the commands you have run so far into this m-file, one command per line. You can copy and paste your commands from the "Command History" window if you don't want to type them.

   Save your m-file after filling entering all the commands. Type **`ps02`** at the command line and hit the <Enter> button. Your plot should have been generated again. If you get an error, you have a typo somewhere, most likely.

II. Section 2.2

Read over the "Scalar Operations" portion of this section.

1. Compute the area of a triangle with height 26.37 cm and base 69.474 cm. ____________ cm^2

2. Compute the area of a triangle with height 14.31 in and base 10.15 cm. ____________ cm^2

   Note: 1 in = 2.54 cm.

3. What is the value of $f(-0.31)$ if $f(x)$ is defined as:

$$f(x) = \frac{12x^3 - 12.45x^2 + 6x}{2.80x^3 - 18x^2 - 2.5}$$

   $f(2.65)$=___________

4. Using the ideal gas law (PV=nRT) and the parameters given on the next page, find the mass in kg of the air in the wind tunnel (use Example 2.1 to guide you).

   Volume = 1075 m^3

Air temp = 23° C (note: K = °C + 273)

Air pressure = 94.25 kPa

Molar mass of air = 29.3 g/mole

Mass = _________ kg

Read over the "Element-By-Element Operations" portion of this section.

1. Create an array called "x" of 6 linearly spaced elements between -17 and 37.5 (use the **linspace** function). What are the elements?

   x = ________ _________ __________ ___________ __________ __________

2. Create the array theta = [-35 0 35 70]. If these are amounts of degrees in an angle, how many radians do each value in degrees correspond to?

   theta (radians) = ___________ _____________ ______________ _____________

3. Let's say you want to calculate the expected drag (in Newtons, N) on an aircraft model in a wind tunnel for a range of different velocities. Given the following drag equation and known parameters, create a new m-file called "ps02_drag.m" and enter the code necessary to calculate and plot the drag for velocities from 0 mph to 90 mph using an interval of 6 mph. Note: 1 N = 1 kg-m/s^2, and 1 mph = 0.44704 m/s.

$$\text{Drag} = C_d \frac{rV^2 A}{2}$$

   where C_d = drag coefficient = 2.0019 x 10^7 (a unitless number)

   r = air density = 1 x 10^{-6} kg/m^3

   V = velocity in m/s

   A = reference area = 1 m^2

   Your plot should display velocity (x-axis) vs. drag (y-axis) and have proper axis labels and a title that includes your name. **Print out a copy of the plot to turn in with this worksheet.**

4. Read over Example 2.3. Create a new m-file called "Example2_3.m" and enter the code called for in Example 2.3 of the text with the following change: calculate the velocity and acceleration at times 7, 12 and 23 sec. Record your results below.

Time	Velocity (m/s)	Acceleration (m/s^2)
7	_________	_________
12	_________	_________
23	_________	_________

For this assignment, turn in the above along with the plot from the drag problem above