MATLAB WORKBOOK1

Instructions

1) You must turn in all MATLAB code that you write to solve the given problems using an "*m*" file script. Please do NOT copy and paste the code into a word processor.
2) When generating plots, make sure to create titles and to label the axes. Also, include a legend if multiple curves appear on the same plot.
3) Comment on MATLAB code that exceeds a few lines in length. You can include in-line comments to clarify complicated lines of code.

A. MATLAB Basics
   1. Create a 6 x 1 vector ***s*** of zeros using the zeros command.
   2. Create a row vector ***a*** from 325 to 405 with an interval of 20.
   3. Use *sum* to find the sum ***s*** of vector ***a***'s elements.

B. Matrix and Vector Operations
   1. Create the following two vectors and add them.

      a =

      5 3 1

      b =

      1 3 5
   2. Now subtract them.
   3. Perform element-by-element multiplication on them.
   4. Perform element-by-element division on them.
   5. Raise one of the vectors to the second power.
   6. Create a 3 x 3 matrix and display the first row of and the second column on the screen.

C. Basic 1D Plot Commands

   Plot projectile trajectories using equations for ideal projectile motion:

$$y(t) = y_0 - \frac{1}{2}gt^2 + (v_0 \sin\theta_0)t$$

$$x(t) = x_0 + (v_0 \cos\theta_0)t$$

where $y(t)$ is the vertical distance and $x(t)$ is the horizontal distance traveled by the projectile in meters, g is the acceleration due to Earth's gravity $g = 9.8\ \mathrm{m/s^2}$ and t is time in seconds. Assume that the initial velocity of the projectile $v_0 = 10\ \mathrm{m/s}$ and the projectile's launching angle $\theta_0 = \pi/6$ radians. The initial vertical and horizontal positions of the projectile are given by $y_0 = 0\ \mathrm{m}$ and $x_0 = 0\ \mathrm{m}$. Plot y vs. t and x vs. t in one figure but two separate subplots with the vector: $\boldsymbol{t = 0{:}\,0.1{:}\,10}$ representing time in seconds. Give appropriate titles to the graphs and label the axes. Make sure the grid lines are visible.

D. Plotting Multiple Functions

1. Using the *plot* command for a single plot and the hold commands, plot $y = \mathrm{atan}(x)$ and $y = \mathrm{acot}(x)$ on the same graph for values of x defined by $\boldsymbol{x = -pi/2{:}\,pi/30{:}\,pi/2}$.
2. Using the *ezplot* command, plot $y = 3\sin(2\pi x)$ for values of x such that $\mathbf{0 < x < 2 * pi}$.