CS 105 – Introduction to Scientific Computing

Assignment 5 – Interactive Scripts

Objectives

After completing this assignment you should be able to:

1. Use the *disp* function to display content to the command line
2. Use the *input* function to get data from the user via the command line
3. Use data obtained from a user in a script.

Overview

Many interesting program need to get information from a user and provide some feedback. While this can be done (and often is done) using *graphical user interfaces (GUIs)* an easier way is through the *command line*

In this assignment you will practice getting information from a user using the command line, and output information to the command line.

Part I: Compute the Distance Between Two Points (Textbook Problem 2.11)

The distance between two points (x_1, y_1) and (x_2, y_2) on a Cartesian coordinate plane is given by the equation:

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Write a program (script) to calculate the distance between any two points specified by the user.

HINT: Ask the user 4 times for input (once for x_1, once for x_2, etc..). Use the disp function to show the user the computed distance.

Part II: Plot the Position and Velocity of a Ball (Textbook Problem 2.10)

If a stationary ball is released at a height h_0 above the surface of the Earth with a vertical velocity v_0, the position and velocity of a ball as a function of time will be given by the equations:

$$h(t) = \frac{1}{2}gt^2 + v_0 t + h_0$$

$$v(t) = gt + v_0$$

where `g` is the acceleration due to gravity (-9.81 m/s^2), `h` is the height above the surface of the Earth (assuming no air friction), and v is the vertical component of velocity.

Write a Matlab program (script) that *prompts* the user for the initial height of the ball in meters and the velocity of the ball in meters per second. Then plot the height and velocity as a function of time (two different plots on the same figure, use the legend function to label them).

Hint:

- *Let time t be a vector. Play with the initial value (probably 0), the final value, and step of this vector then compute h and v using vector mathematics.*
- *Put both plots on the same figure (t vs h and t vs v)*

Submission

Submit a z*ip* file that consists of:

1. Your PDF report that describes what you did for both Part I and Part II. You should include the figure for Part II
2. The .m files created to do Parts I & II

Combine all your scripts into a single zip file for submission.