

COMP1200-MatLab - Lab 08
Due midnight – Thursday – November 3
Submit hubbleData.txt and Lab08.c **via Blackboard**

Before you start writing your program:

Read all of these instructions carefully. Submitting a development plan is not required for this assignment. I suggest that you create one before writing your program.

Problem:

Program: Lab08.m

Edwin Hubble used the Mount Wilson Observatory telescopes to measure features of nebulae outside the Milky Way. He found that there is a relationship between a nebula's distance from earth and the velocity with which it was traveling from the earth. Hubble's initial data on 24 nebula is presented in Table 1 in the problem scenario.

NOTE: You will see later that the spelling and casing of file names is very important in MATLAB. Your submitted file(s) MUST be spelled and cased as instructed. [-5 points per file for not doing so.]

The relationship between distance and velocity led scientists to propose that the universe came into being with a Big Bang, a long time ago. If material scattered from the point of the Big Bang traveling at a constant velocity, the distance traveled can be determined.

Using Hubble's data, find the linear equation that estimates the relationship between the velocity and distance readings. Display the data on a graph.

Instructions:

- ☐ Insert comments at the top and throughout each file
 - Include the follow comments at the beginning of this (and ALL) files.
 - `% your name`
 - `% assignment number`
 - `% date you completed the assignment`
 - `% a short narrative about what the file does`
 - Use your development plan as a guide for comments throughout each file
- ☐ Use `clc` and `clear all` at the beginning of your program.
- ☐ Use descriptive variable names.
- ☐ Use Sample Input/Output as a guide.
- ☐ No extra output, i.e., use semicolons!
- ☐ You will use two **user defined functions** in Lab08.m to (1) compute the slope and y-intercept and (2) display a graph. ALL OTHER TASKS WILL BE ACCOMPLISHED BY Lab08.m.
- ☐ Using a data file
 - Protect your program from crashing by making sure that the file exists. If the file doesn't exist, print the error message and end the program.
- ☐ Input:
 - Read Hubble's data from `hubbleData.txt`
 - There are five columns of data in the data file. Read the velocity and distant columns into vectors skipping the other columns. Compare `hubbleData.txt` with the table in the scenario for the column content.
- ☐ Computation
 - Create a user defined function named **compSlopeIntercept** to compute the slope and y-intercept for the given velocity and distant.
 - Use following function statement to start your function. You may use different variable names for input and output variables, but they should represent the same information.

-5 points per file for absence of any of these required comments at the top

function [mSlope, yIntercept] = **compSlopeIntercept**(xVector, yVector)

□ Output

- Print the velocities and distances in a two columns with a title and column headings
- Create a user defined function `plotHubbleData` to display the data in a scatter plot and line of the graph a linear equation.
 - Use the instruction given in Lab07.
 - Use the following function statement to start your function. You may use different variable names for input and output variables, but they should represent the same information.

function `plotHubbleData(xVelocity, yDistance, mSlope, yIntercept)`

□ Use the linear equation

- Ask the user to enter one of the velocities entered earlier and compute the distance using the linear equation that you create.
- If the user types a value that is not in the file velocity list, ask the user to enter another value.
- Note: The distance may not be the exact value because of the limited amount of input.

□ Printing:

- Use **fprintf** for all output.
- Decimal places:
 - velocity 0
 - distance 3
 - slope 4
 - y-intercept 3
- Column numbers **right-justified**, i.e., right-aligned
- No extra blank spaces in the other output.

New commands

`exist`
`formatted textread`
 skip columns when reading file
 user defined functions

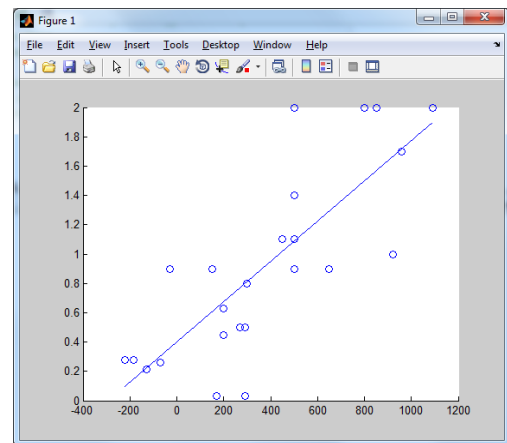
Other than a data validation loop, loops are not required.
 Indexes are not required.

Sample Input/Output:

```

NEBULA INPUT DATA
VELOCITY  DISTANCE
km/sec    106 parsecs
  170      0.032
  290      0.034
 -130      0.214
. . .
  500      2.000
  850      2.000
  800      2.000
 1090      2.000

```



```

Enter a velocity of a nebula from above: 30
Enter a velocity of a nebula from above: -70
For velocity = -70, distance = 0.303

```

Submit via Blackboard:

Lab08.m MATLAB script file
 hubbleData.txt Data file