

Math 261 Fall 2011
Assignment #5

This assignment is due at the beginning of class on Monday, October 24, 2011.

- 1.** The file `data.mat` available in either the directory

`/u2/math261/` or `/u2/cs261/`

or online at

<http://stat.math.uregina.ca/~kozdrone/Teaching/Regina/261Fall11/Assign/Assign05Data/>

defines a 100×2 matrix called `data`. You will analyze this data by determining the equation of the least squares line. Use the first column of `data` as the independent variable (i.e., the x variable) and the second column as the dependent variable (i.e., the y variable). Write a short program to determine the equation of the least squares line. Do not use any native MATLAB commands like `regress` to solve this problem. Instead design your program to read in `data`, compute b and m by summing up the appropriate terms, and then output $y = mx + b$.

Note that the file `data.mat` is a MATLAB data file. If you want to look at the actual numbers, you can look at the file `data.txt`. If you want to use OCTAVE, then you should use the file `data.m` instead of `data.mat`.

- 2.** The purpose of this problem is to determine a secret word. Determine the Lagrange interpolating polynomial $P(x)$ using the points

$$\begin{aligned}x_0 &= 1, y_0 = 149674925 \\x_1 &= 2, y_1 = 386437459 \\x_2 &= 3, y_2 = 729429125\end{aligned}$$

and then compute $P(0)$. Your value of $P(0)$ will have 8 digits. Group the digits in pairs and convert them to letters using the scheme $A \leftrightarrow 01, B \leftrightarrow 02, \dots, Z \leftrightarrow 26$. For example, 13012008 decodes as MATH. Note that you can solve this problem either using a computer or by hand.

- 3.** When answering the following questions, you will find it a lot easier to use a computer (or calculator). It would be ideal if you wrote a program that accepted as inputs the nodes $(x_0, y_0), \dots, (x_n, y_n)$ and was able to output the value of the Lagrange interpolating polynomial at a user specified point.

(a) Exercise 6(a) page 115.

(b) Exercise 18 page 116.

- 4.** Exercise 10 page 115.