CS 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/~kozdron/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

$$x_0 = 1,\ y_0 = 149674925$$
$$x_1 = 2,\ y_1 = 386437459$$
$$x_2 = 3,\ y_2 = 729429125$$

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, ..., 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 $(x_0, y_0), \ldots, (x_n, y_n)$ 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.