CS130 Assignment #2

Date assigned: Monday, September 28, 2009
Date due: Monday, October 5, 2009
Points: 50

You are to add the following two worksheets to the Workbook you turned in for Assignment #1.

Worksheet #3 (Name it **Simulation**)

Paramecia are unicellular micro-organisms that tend to feed on bacteria, algae, and yeasts. Take a look: http://www.youtube.com/watch?v=l9ymaSzcsdY.

We are going to do a simulation involving paramecia and bacteria to see how the populations change day by day given the following formulas:

$bacteria_{tomorrow} = (1 + a) * bacteria_{today} - c * bacteria_{today} * paramecia_{today}$

$paramecia_{tomorrow} = (1 - b) * paramecia_{today} + c * d * bacteria_{today} * paramecia_{today}$

where

a = 0.01	(fractional increase in bacteria population)
b = 0.005	(fractional decrease in paramecia population)
c = 0.00001	(likelihood that a paramecia will encounter and eat a bacteria)
d = 0.01	(fractional increase in paramecia population attributed to eating a bacteria)

You are to design a professional looking Excel worksheet to simulate the above problem for a period of 1000 days showing the Day, Bacteria, and Paramecia values for each day for 1000 days. Initial values for paramecia are 20 and for bacteria are 200. Allow the user the ability to enter and change values for paramecia, bacteria, a, b, c, and d at the top of the worksheet. At the bottom of the Bacteria and Paramecia columns report on the maximum and minimum number of each micro-organism during the given time period. Also, split the worksheet showing the top 12 rows and bottom 10 rows.

Worksheet #4 (Name it **Pharmaceutical**)

A pharmaceutical company has done extensive drug research and is now ready to begin producing and selling the drug. The company estimates that the total cost of making g grams of the drug can be given by the following formula:

c(g) = 1,000,000 + 5,000g

You are to perform each of the following tasks:

1) Construct a worksheet (professionally labeled) that shows the average cost per gram of the drug with values ranging from g = 1000 to g = 20,000 in increments of 1,000 grams. Include a title at the top of the worksheet using merged cells.

2) In the same worksheet and to the right of the column data, create a graph that visually displays the results from the worksheet created in problem 1). The graph must be properly labeled and easy to read and understand.

3) In cell A30 place a comment with the answer to the following question: What is a possible reason that the cost of making 0 grams of the drug is $1,000,000?

4) In cell A31 place a comment with the answer to the following question: What is the average cost per gram of the drug if 9,500 grams of the drug are sold? Give your answer to three decimal places.

5) In cell A32 place a comment with the answer to the following question: How many grams of the drug need to be sold so that the average cost of the drug is $5,750? Give your answer to three decimal places.

Notes for all worksheets:

- Changing any values of a worksheet must update the entire worksheet with accurate values based on the above formulas.
- I must be able to drag down your last row to get additional information or more refined answers.
- Make sure the actual text of any comment is displayed when the worksheet is opened. I don't want to have to click on a cell to see the comment.

Submitting your work:

To submit your work, copy your **single** Excel workbook containing the four worksheets into the **CS130 Drop** folder on Turing. You must submit this before **6pm** for your assignment to be considered on time. Reread the syllabus for the late policy. The official time can be found http://time.gov/timezone.cgi?Pacific/d/-8/java.

Grading:

Grading will be based on:

- Correctness of your results
- Completeness of your results
- Professional look of the worksheets as described above and discussed in class.
- Ability to perform a what-if analysis by changing any of the user input data with accurate results correctly displayed based on the changed data.

Start Early!!!