SLP Part 1

You have been experimenting with different prices per glass and have found that you sell the following cups per day depending on the price you charge:

Price	Cups Sold
0.25	230
0.5	205
0.75	180
1	155
1.25	130
1.5	105
1.75	80
2	55
2.25	30
2.5	0

Now that your experiment is over you wish to find a function to tell you how many cups you will sell as a function of the price. Since the consultant from Price Waterhouse charges $500 per hour to estimate this function for you, you have decided instead to estimate the function yourself.

Luckily, there is a method using calculus that helps you estimate functions from data. This is called the method of least squares, also known as regression. Also, lucky for you there are web pages that do the calculations for you. Here is one such page:

Simple Regression Page

To calculate your function, type in the prices in the column marked "X" and type in the number of cups sold in the column market "Y". Then hit the button marked "Y= mX + b".

After you have your answer, report your results in an executive summary that includes,

A. Your function, and specify what the slope and intercept of your function is.

B. What this function tells you about the relationship between the price and the number of cups sold.

C. How you plan on using this function to help you maximize the profits of your lemonade stand.

SLP part 2

Welcome to the second SLP. Now that you have estimated your function, you now want to know what your revenue will be at each price. This is easy to calculate, you simply multiply the price by the number of cups you will sell at that price.

The instructions for the assignment are as follows:

A. Create a function to determine how much revenue you will make at each price you charge. This is done by multiplying the price times your function. For example if your function is Cups Sold = 1000 - 100*Price, your revenue function would be Price*(1000 - 100*Price). For simplicity sake, you can write Price as "P".

B. What is the derivative of your revenue function?

C. Create a table (you can use Excel) with each of the columns:

1. The prices from the table in the Module 1 SLP

2. The revenue you will make at each price

3. The value of the derivative at each price

D. At what price is your revenue maximized

E. What is the value of the derivative when you are charging more than the revenue maximizing price? How about when you are charging less? Based on this, how would you use the derivative to help you decide how much to charge for a cup of lemonade?

SLP part 3

Welcome to module three's SLP. In the module two's SLP you maximized revenue. In this module, you will be maximizing profit. In order to maximize profit, you have to take the cost of your lemonade and your cups into account. Suppose it costs you a total of 50 cents to make a cup of lemonade.

The assignment instructions are as follows:

A. Write a function for your profits for each price you charge. This is done by multiplying (P-.5) times your function from Module 1. I.e. if your function is Cups Sold = 1000 - 100P, your profit function would be (P - .5)*(1000 - 100P).

B. Calculate the first derivative of your profit function, and create another table with the price, profit, and value of the first derivative at the prices from Module 1. Can you tell what your profit maximizing price is from this table?

C. Calculate the second derivative, and also use the first derivative to find the profit maximizing price. What is the price, and what does the second derivative tell you?

SLP part 4

Welcome to module four's SLP. Now let's suppose that Price Waterhouse consultant decides to work for you for free. This consultant tells you that you have it all wrong, the price you charge should be $1 per cup. Also, he tells you that your revenue will be different depending on which day of the week you are open. Specifically, he says your sales will be lowest on Monday and highest on Friday (you are closed on the weekends). He has estimated the revenue function as follows:

Revenue at day D = (200 + 10D - 100P)*P

D refers to the day, with Monday being 1, Tuesday 2, etc up to Friday with a value of 5. The assignment is as follows:

1. If you are charging $1 per cup, what is your revenue for each of the five days? What is your total revenue for the week?

2. What is the indefinite integral of your revenue function with respect to D? (If it makes things easier you can substitute 1 for P in the function).

3. Now find the definite integral for your revenue function over the interval [0, 5]. What answer do you get? Is it the same as your answer to 1. above?