Problem Solving #3

Due: Friday, October 28

Work in groups of 3 or 4. Each group should submit one paper. This problem set is due **Friday, October 28**. Should you happen to need a cubic equation solver, you can find one at `http://www.1728.com/cubic.htm`

Problem 1:

Let $f : [0, 15] \to \mathbb{R}$ by

$$f(x) = -3x^4 + 52x^3 - 180x^2 + 27$$

Find the maximum value of f on this interval as well as the point at which the maximum occurs. You may handwrite your solution to Problem 1. Show work as you would on any routine math homework assignment.

Problem 2:

You work in the corporate office of a toy manufacturing company, and you have just received the following memo from your less-than-intellectually-gifted boss. It helps to pretend that your name is Bill for this.

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21 Oct 2005

Bill,

We've been having a crappy year. As you know, we've been projecting that our net loss this year is going to be about $892,000.

However, we've just received word from Shmizney that they'd like to buy some of our brand new Ultra-Huge Flame-Throwing Dumbo Dolls. The design isn't even complete yet, but we figure we can have it together by the end of the year to meet the budget committee. Still, no matter what, there's no way we're going to be able to produce more than 15 of these by the end of the year. According to our analysts, due to the extra man-hours, overtime payments, and production costs the project would involve, our projected net profit (in thousands of dollars) for the year will be given by

$-50n^4 + 485n^3 - 1631.5n^2 + 2213.95n - 891.8$, where n represents the number of these things we get out by the end of the year.

Of course, negative net profit means net loss, and that's where we're at right now. I don't know what the rest of that means, though, and noone else in the department does either. You've got to figure this out and tell me if it'd even be worth it to make these things. If you give us the go-ahead for this, how many should we make to maximize our profit, or at least minimize our losses? Get back to me on this by the end of next week!

Your boss,
Willith Lumberger

- Part 1: Write a reply to your boss that he can understand. Be diplomatic enough to not get yourself fired. Include your recommendation. Imagine you're giving this to your real boss.
- Part 2: On a separate page, explain to your instructor why the answer you gave to your boss is correct. Also explain how this problem and its solution differ significantly from the problem and solution in Problem 1.

Your responses to Problem 2 must be typed using complete sentences.