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**This assignment is due by 3:30 pm on March 5, 2009** You can turn it in to me in class or drop it by the office, **Blocker 640D**. Be sure that you follow the homework rules, they can be found on your syllabus. Please work the problems in the order that they are listed.

- An electronics company manufactures a mini calculator. The daily total cost of producing these calculators (in dollars) is given by  $C(x) = 0.0001x^3 - 0.08x^2 + 40x + 5000$  where  $x$  stands for the number of calculators produced.
  - Find the exact cost of producing the 351<sup>st</sup> calculator.
  - Estimate the cost of producing the 458<sup>th</sup> calculator.
  - Compute  $\overline{C}(400)$  and interpret the result.
- A business has determined cost and revenue models for one of its products.
$$C(x) = 11x^2 + 7500$$
$$R(x) = x^3 - 6x^2 + 65x$$
 $x$  is the number of items that are produced and sold.  $C(x)$  and  $R(x)$  both have units of dollars.
  - Find the marginal average profit function.
  - Find the average profit and the marginal average profit when 35 items are produced.
  - Use the results from part (b) to estimate the average profit per item if 36 items are sold.
- $C(x)$  is the total cost (in dollars) of producing  $x$  items. If  $C(500) = 350$  and  $C'(500) = 8.75$  then find the total cost of producing 501 items.
- You have an account that you started with \$12,250.
  - How much money will be in the account after 10 years if the account pays an interest rate of 6.45% compounded continuously?
  - If you wanted the money to double in 10 years, what interest rate compounded continuously would you need?
- A promissory note will pay \$50,000 at maturity 5 years from now. The note has an interest rate of 6.4% compounded continuously. Note: the way a promissory note works is that you buy it for an amount (smaller than the face value or maturity value) and after a certain time period you will be paid the face value of the note. An example of this are treasury bills.
  - What is the note worth right now? i.e. if you bought this note right now what would you pay for it.
  - You bought the note and cashed it after 5 years. How much interest did you earn?
- Find the derivatives of these functions. **DO NOT SIMPLIFY YOUR ANSWERS.**
  - $f(x) = \frac{x^5 + 7x}{x^3 - 8x^2}$
  - $f(x) = \frac{7}{5 - x^4}$
  - $y = (x^3 + 5x + 7)^{25}$
- Find the derivatives of these functions. **DO NOT SIMPLIFY YOUR ANSWERS.**
  - $y = e^{7x^5 - 6x^2 + 3}$
  - $y = (5x^4 + e^{2x}) 3x^2$
  - $y = \log(5x^3)$