Math 205 Exam II

7:15–8:15pm, Thursday October 13, 2005

Instructor:_____ **Class Time:**_____ **Name:**_____

No books or notes are allowed. Please read the problems carefully and do **all** you are asked to do. **You must show your work!** You can use the back page as scratch paper. Do the problems in the space provided.

Total/100	#1	#2	#3	#4	#5	#6	#7	#8

1(total points: 13). The following table shows $f(t)$, total population of a town, in number of people, as a function of year t.

Year, t	1996	1998	2000	2002
Number of people, $f(t)$	10028	10089	10140	10195

(a)**(6 points).** Estimate $f'(2002)$. Give units with your answer and interpret your answer.

(b)**(7 points).** Use the results of part (a) to estimate $f(2005)$. Interpret your answer.

2(total points: 13). Cost and revenue functions for a company are shown in the following figure.

(a)(7 points). If the current production level is 500 items, should the company produce the 501st item?

(b)(6 points). Estimate the quantity which maximizes profit.

3(total points: 13). Use the following graph of a given function f.
(a)(7 points). Estimate the intervals on which $f'(x) > 0$ and
the intervals on which $f'(x) < 0$.

(b)(6 points). Estimate the intervals on which $f''(x) > 0$ and the intervals on which $f''(x) < 0$.

4(total points: 12). Let $f(x) = (2x)^x$. Use the average rate of change of f over the interval $0.99 \leq x \leq 1.01$ to estimate $f'(1)$.

5(total points: 12). Differentiate

(a)(6 points). $f(x) = 3 + ax + 4^x + \dfrac{2}{\sqrt{x}}$

(b)(6 points). $f(t) = e^t - \ln t + 3t^3$

6(total points: 12).

(a)(4 points). Find the derivative of $f(x) = (1 + e^x)^{2005}$.

(b)(4 points). Find the derivative of $f(x) = e^{(1-2x)}$.

(c)(4 points). Find the derivative of $f(x) = 5\ln(3x^2 + 1)$.

7(total points: 12).
(a)(6 points). Differentiate $P(t) = te^{-t}$

(b)(6 points). Find the derivative of $y = \dfrac{x^2}{1+x}$ and simplify it.

8(total points: 13). Find an equation for the tangent line at $x = 0.8$ to the graph of $y = 2x + e^{5x-4}$.