MATH 211 C EXAM III NAME _____

Prof. J. Beachy 11/15/02 Circle recitation time: T 10:00 T 11:00 Th 11:00

Be sure to show all necessary work. NO CALCULATORS!

1. (10 pts; see p 243 Example 6)

Find the absolute maximum and minimum values of $f(x) = 5x + \dfrac{35}{x}$ on the interval $[1, 5]$.

2. (15 pts; p 254 Example 4)

A stereo manufacturer determines that in order to sell x units of a new stereo, the price per unit must be $p = 1000 - x$. The manufacturer also determines that the total cost of producing x units is given by $C(x) = 3000 + 20x$. How many units must the company produce and sell in order to maximize profit?

3. (5 pts for each part) Find the derivative of each of these functions.

(a) $f(x) = e^{-x^2+7x}$ (p 298 #21)

$f'(x) =$

(b) $f(x) = \ln(5x^2 - 7)$ (p 314 #51)

$f'(x) =$

(c) $f(x) = \dfrac{e^{2x} - 1}{e^x + 1}$

$f'(x) =$

(d) $f(x) = e^{\sqrt{x}} + \sqrt{e^x}$ (p 299 #63)

$f'(x) =$

(e) $f(x) = \ln\left(\dfrac{e^x\sqrt{x^4+1}}{(x^2+1)^3}\right)$

$f'(x) =$

4. (15 pts) The size of a certain population at time t is given by $P(t)$. The function $P(t)$ has these properties: $P'(t) = .08P(t)$ and $P(0) = 3{,}000$.

Find the formula for $P(t)$, and then find $P(10)$.

Use these approximate values:

$e^{8} = 2981$
$e^{0.8} = 2.226$
$e^{0.08} = 1.083$
$e^{0.008} = 1.008$
$e^{0.0008} = 1.0008$

5. (15 pts) A physics professor notices that attendance in her class seems to be decreasing exponentially. After starting with 100 students, there are 90 attending after 4 weeks. How many would she expect to be attending after 8 weeks?

6. (20 pts; p 263 #33)
A rectangular box with a volume of 350 ft^3 is to be constructed with a square base and top. The cost per square foot for the bottom is 15 cents, for the top is 10 cents, and for the sides is 2.5 cents. What dimensions will minimize the cost?

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TOTAL	/ 100
GRADE	
AVG	

EXTRA CREDIT (p 359 #25, to replace your lowest quiz grade):
On the back of this page, find the maximum and minimum values of $f(x) = x^4 e^{-x}$ on $[0, 10]$.