MATH 211 C EXAM III NAME _____
Prof. J. Beachy 4/23/03 Circle recitation time: T 10:00 T 11:00 Th 10:00
No calculators!

1. (6 pts each) Find the derivative of each of these functions.

(a) $f(x) = e^{-x} + xe^{-2x} + x^3$ (4.1 #29)

$f'(x) =$

(b) $f(x) = \ln(5x^2 - 7)$ (4.2 #51)

$f'(x) =$

(c) $f(x) = \ln\left(x + \sqrt{1 + x^2}\right)$ (4.2 #89)

$f'(x) =$

(d) $f(x) = e^{\sqrt{x}} + \sqrt{e^x}$ (4.1 #63)

$f'(x) =$

(e) $f(x) = \ln\left[\dfrac{x^5}{(x+5)^2}\right]$ (4.2 #83)

$f'(x) =$

2. (20 pts) Find the following antiderivatives and integrals.

(a) $\int \left(x^2 - \frac{3}{2}\sqrt{x} + x^{-4/3} \right) \, dx =$ (5.1 #25)

(b) Find the cost function $C(x)$, given that the marginal cost is $C'(x) = x^3 - 2x$ and the fixed cost is $C(0) = 100$. (5.1 #31)

(c) $\int_1^e \left(x + \frac{1}{x} \right) \, dx =$ (5.2 #41)

3. (10 pts; 5.3 #35) The temperature over a 10 hour period is given by $f(t) = -t^2 + 5t + 40$, for $0 \leq t \leq 10$. Find the average temperature during this period.

4. (20 pts) (a) Find the area under the curve $y = x^2 + 1$, over the interval $[1, 3]$. (Use a definite integral to find the area.)

(b) Approximate the area under the curve $y = x^2 + 1$ over the interval $[1, 3]$ by computing the area of each rectangle in the given graph and then adding.

5. (10 pts) A colony of sea monsters is growing at a rate proportional to its size. Observations show that the population is tripling every 11 years. How many years will it take for the population to become 6 times its original size?

If necessary, use these values:

$\ln 2 = .69$
$\ln 3 = 1.10$
$\ln 4 = 1.39$
$\ln 5 = 1.61$
$\ln 6 = 1.79$
$\ln 7 = 1.95$
$\ln 8 = 2.08$
$\ln 9 = 2.20$
$\ln 10 = 2.30$

6. (10 pts; 4.4 #35) Newton's law of cooling leads to the formula $T(t) = ae^{-kt} + C$ for the temperature at time t, where C is the constant temperature of the surrounding medium. Suppose that the temperature of a hot liquid is 100° and the room temperature is 75°. The liquid cools to 90° in 10 minutes.

(a) Find the value of the constant a. (b) Find the value of the constant k.

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Grade	
Quiz Avg	
Sem Avg	