

MATH 211, Fall, 1997

Holland, EXAM III

NAME _____

SIGNATURE _____

SSN _____

SECTION _____

INSTRUCTIONS:

1. You must **SHOW YOUR WORK** in order to get credit. ALL WORK should be organized to be readable and must be of sufficient depth to justify your answer. Correct answers with incorrect work or insufficient justification will receive no credit.
2. Make certain that your test has all four (4) different sheets (including the cover page).
3. Put your answers in the boxes provided with the problem.
4. The point value of each problem is given in the brackets at the right of the problem number.
5. **NO CALCULATORS ALLOWED!**

1. (28 points) Differentiate the following functions and simplify.

(a) $y = \frac{e^x}{3 - e^x}$

(b) $y = e^{4x^3 - 5x}$

(c) $y = \ln(3x^5 + 2)$

(d) $y = \frac{x}{\ln x}$

2. (20 points) Solve the following equations for x .

(a) $\ln(3 - 2x) = \frac{1}{5}$

(b) $e^{3 \ln x + \ln 2 - 4 \ln x} = 3$

3. (22 points) Find all values of x at which the following functions have relative extrema. Determine whether the extremum is a relative maximum or a relative minimum.

(a) $f(x) = (4 - x)e^{x+5}$

(b) $f(x) = 3 + 5x - 2e^x$

4. (10 points) Suppose that the size of a bacterial culture grows exponentially and that an initial population of 300 bacteria grows to 1500 after 2 hours. Find the formula $P(t)$ for the size of the population after t hours.

5. (10 points) The half-life in the blood stream of a new injectable heart drug, Tanzil, is 3 hours. How long after an initial dose of Tanzil is injected will only one-fifth of the initial dose remain in the bloodstream?

6. (10 points) Compute the following antiderivatives.

(a) $\int e^{-30x} dx$

(b) $\int (5 - 3x + 2x^2) dx$