Name:

MATH 192 Exam 2

Show all work to receive credit. Calculators are permitted, but please indicate what is done by calculator as part of showing your work.

1. a) Find $\frac{dy}{dx}$ at the point $(2, 1)$ if $xe^{y^2} + xy = 2 + 2e$. Leave your answer in exact form.

b) Find the equation of the tangent line to the graph in part a) at the point $(2, 1)$; again, leave your answer in exact form and do not simplify.

2. a) If a couple has $3,000 to invest now, how much will they have after 5 years from an investment yielding five percent annual interest compounded continuously?

b) For an investment yielding five percent annual interest compounded continuously what is the doubling time?

c) They abandon their plan to invest $3,000 and decide, instead, that they want to have $10,000 in three years. If they can make an investment now at 5 percent annual interest compounded continuously, how much must they invest?

3. You are given the following information about a function f: f' and f'' both exist at all real numbers. As well, $f'(x) < 0$ for all x such that $x < -1$ or $x > 2$, and $f'(x) > 0$ for all x such that $-1 < x < 2$. Further, $f''(x) > 0$ for all x such that $-3 < x < 0$ or $x > 5$, and $f''(x) < 0$ for all x such that $x < -3$ or $0 < x < 5$. Finally, assume f'' is continuous. Sketch a possible graph of f in the coordinate system provided, labeling local maxima and minima and points of inflection and giving their x coordinates.

4. Find the absolute maximum and minimum values of $x^3 - 3x^2 - 9x - 2$ on the interval $[-2, 4]$. You may use your calculator to solve equations and compute values of expressions, but must show sufficient work by hand for all other parts of this problem. In particular, simple reference to a calculator graph or calculator assertion about maximum or minimum will receive no credit.

5. A computer game company estimates that demand D for a new game (in number of games) is a function of the price x in dollars, with expression $D(x) = -15x^2 - 90x + 146025$.

a) Compute the elasticity of demand at a price of \$35 per game. Is demand elastic or inelastic at this price? Interpret the answer in practical terms for the company.

b) Compute, from an elasticity of demand approach, the price for maximum revenue to the company.

6. A farmer wishes to fence a rectangular area with two inner fences running parallel to one of the sides and partitioning the area into three sub-rectangles, as shown in the diagram. If the total area of the large rectangle is to be 100 square feet, what is the minimum possible total length of fencing that can be used?