EXAM 1 - MATH 151
DATE: Friday, February 22
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 20 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Consider the quadratic function $f(x) = x^2 - 6x - 7$.

   (a) Find its x-intercepts. (5 points)

   (b) Find its vertex. (3 points)

   (c) Find its y-intercept. (2 points)

   (d) Sketch its graph showing clearly all critical points. (5 points)

   (e) Find its domain and range. (5 points)

2. The price p and the quantity x sold of a certain product obey the demand equation

$$x = -20p + 500, \quad 0 \le p \le 25.$$

   (a) Express the revenue R as a function of x. (5 points)

   (b) What quantity x maximizes the revenue? (5 points)

   (c) What is the maximum revenue? (5 points)

   (d) What price should the company charge to maximize the revenue? (5 points)

3. (a) Use a small 3-value table to plot the graph of the exponential function $f(x) = (\frac{1}{4})^x$. (5 points)

   (b) Solve the exponential equation $2^x \cdot 8^{-x} = \frac{1}{2} \cdot 4^x$. (10 points)

   (c) If $5^{-x} = 3$, what does 5^{4x} equal to? (5 points)

4. (a) Use a small 3-value table to plot the graph of the function $f(x) = \log_3 x$. (10 points)

   (b) Solve the logarithmic equation $\log_2 (x^2 - 1) = 3$. (10 points)

5. (a) Write as a single log the expression $2\log_3 5 + 5\log_3 (x^3) - \frac{1}{2}\log_3 (2x + 3)$. (10 points)

   (b) Find the domain of the logarithmic function

$$f(x) = \ln\left(\frac{3 - 2x}{x - 7}\right).$$

   (10 points)