Calculus I Exam Three

Name: _____

Please show all work on these problems. Use of a calculator is permitted.

1. Find the absolute maximum and minimum of $f(x) = 2x^3 + 9x^2 - 60x + 1$ on the interval $[0, 5]$.

2. Calculate $\lim\limits_{x \to \infty} 7x^2 e^{-x}$.

3. Suppose $f(x) = x^4 - 8x^3 - 3$.

(a) Find the open intervals where f is increasing and the open intervals where f is decreasing, and find all local maxima and minima of f.

(b) Find the open intervals where f is concave up and the open intervals where f is concave down, and find all inflection points of f.

(c) Sketch a graph of f that illustrates the above characteristics. Label all local maxima, local minima, and inflection points.

4. A rectangular field is bordered by a fence on its North, East, and South sides, and it is bordered by a river on the West side. The total length of the fence is 10 kilometers. Find the maximum possible area of the field.

5. Use Newton's method to find all real solutions to the equation $x^5 - 20x = 10$.

6. Find the linearization of $f(x) = \sin(x)$ at $a = 0$, and use it to estimate $\sin(0.04)$ (angles are measured in radians).