EXAM 2 - MATH 112

YOUR NAME:_____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Compute the following derivatives:

$$\left(3x^2 + \frac{1}{\sqrt[3]{x}}\right)' =$$

$$\left(\frac{x^2}{x+7}\right)' =$$

$$\left[(5x+3)^8\right]' =$$

2. Find an equation for the tangent line to the graph of

$$f(x) = \frac{-64}{\sqrt[4]{x^3 - 11}}$$

at $x = 3$.

3. A certain manufacturer has revenue function

$$R(x) = 3x + \frac{x^2 + 5}{x + 2},$$

where x is the number of items produced and sold. Find the marginal revenue at $x = 5$ and interpret your answer.

4. The position function of a moving object at time t in seconds is given by

$$s(t) = t^2 \left(\frac{1}{3}t - 10 \right)^3 \quad \text{in meters.}$$

(a) Find the velocity of the object at $t = 36$ seconds.

(b) Find (by hand) when the object is at rest (i.e., has velocity 0).

5. Consider the function
$$f(x) = 3x^4 + 8x^3.$$

(a) Compute the first derivative and find all critical points.

(b) Create the sign table for the first derivative, as shown in class. The last line should contain information about the monotonicity of f (where it is increasing/decreasing) and the relative extrema (max/min points).

(c) Use the information gathered to sketch the graph of $y = f(x)$ showing and labeling all important points.