EXAM 2 - MATH 112 Friday, February 28

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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 derivative and write your answer in the same form

$$\left(9\sqrt[3]{x}+\frac{4}{\sqrt{x}}\right)'=$$

2. Find an equation for the tangent line to $f(x)=\left(\frac{x+1}{1-2x}\right)^3$ at $x=2$.

3. A quantity p varies with time (in seconds) according to the equation

$$p(t) = \sqrt[5]{2x^3 + 10}.$$

Find the instantaneous rate of change of p, when $t = 3$ seconds.

4. The cost function of certain manufacturer is

$$C(x) = 5x^2 - 9x + 5,$$

where x denotes the number of units produced.

(a) Write an equation for the average cost $\mathsf{AC}(x)$ of producing x units.

(b) Find the marginal average cost for producing 1 unit and interpret the answer.

5. This problem is about graphing a polynomial function by hand using the first derivative as a tool. Consider

$$f(x) = -x^3 + 6x^2 + 1.$$

(a) Compute $f'(x)$ and find the critical points.

(b) Create the sign table for f', where the last line should summarize neatly all information about f (monotonicity, relative extrema, with all relevant values).

(c) Use the information in the table to sketch the graph of $y = f(x)$.