

PRACTICE EXAM 2 - MATH 112

DATE: Tuesday, October 16

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Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. The demand function for a product is given by $p = \frac{50}{\sqrt{x}}$ for $1 \leq x \leq 8000$. The cost function is given by $C = 0.5x + 500$ for $0 \leq x \leq 8000$. Find the marginal profit function. (5 points)
2. Compute the derivatives of the following functions:
 - (a) $f(x) = (x^2 - x + 2)(x^5 + 4)$ (2 points)
 - (b) $g(x) = \frac{x^5 - x^3 + 5}{x^2 + 7}$ (3 points)
3. Find the equation of the tangent line to the graph of $f(x) = \sqrt[5]{(5x + 2)^3}$ at $x = 6$. (5 points)
4.
 - (a) Let $f(x) = (x + 3)(x - 4)(x + 5)$. Find all points where the tangent line to the graph of $y = f'(x)$ is horizontal. (3 points)
 - (b) Compute the derivative $\frac{dy}{dx}$ if $x^3 + y^3 = 2xy$. (2 points)
5. Find the equation of the tangent line to the graph of $\sqrt{xy} = x - 2y$ at $(4, 1)$. (5 points)
6. Suppose that the radius of a sphere is increasing at a rate of 2 inches per minute when the radius is 6 inches. Find the rate at which the surface area of the sphere is increasing when the radius is 6 inches. (The formula giving the surface area S of a sphere in terms of its radius r is $S = 4\pi r^2$.) (5 points)