PRACTICE EXAM 2 - MATH 112 DATE: Friday, February 23 INSTRUCTOR: George Voutsadakis

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. 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)
- 2. Find the equation of the tangent line to the graph of $f(x) = \sqrt[5]{(5x+2)^3}$ at x = 6. (5 points)
- 3. Find the equation of the tangent line to the graph of $\sqrt{xy} = x 2y$ at (4,1). (5 points)
- 4. 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)
- 5. Find the intervals of monotonicity and the intervals of concavity of the function $f(x) = x^3 6x^2$. (5 points)
- 6. A dairy farmer plans to enclose a rectangular pasture adjacent to a river. To provide enough grass for the herd, the pasture must contain 180,000 square meters. No fencing is required along the river. What dimensions will use the smallest amount of fencing? (5 points)