HOMEWORK 2 - MATH 112 DUE DATE: Friday, September 28 INSTRUCTOR: George Voutsadakis

Read each problem **very carefully** before starting to solve it. Four out of the eight problems will be chosen at random and graded. Each problem graded is worth 3 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- 1. Use the limit definition to find the derivative of the functions
 - (a) $f(x) = \sqrt{x-1}$
 - (b) $g(x) = \frac{1}{x-3}$.
- 2. Use the limit definition of the derivative to find the slope of the tangent line to the graph of the following function at the indicated point:
 - (a) $f(x) = x^2 2$ at (2, 2).
 - (b) $g(x) = \sqrt{x+2}$ at (7,3).
- 3. Use the basic rules for derivatives to compute the derivatives of the following functions:
 - (a) $f(x) = x^3 2x + 4$
 - (b) $g(x) = \frac{4}{x^2} + 5x^7$
 - (c) $h(x) = 7\sqrt[5]{x^3} + 2\sqrt[7]{x^5}$
- 4. Find the value of the derivative at the given point:
 - (a) $f(x) = 3x(x^2 \frac{2}{x})$ (b) $g(x) = 3(5-x)^2$ (c) $h(x) = \frac{2x^3 - 4x^2 + 3}{x^2}$
- 5. Find the slope of the tangent line to the function $f(x) = \sqrt[5]{x} + \sqrt[9]{x}$ at the point (1,2).
- 6. The height s in feet of an object fired straight up from ground level with an initial velocity of 200 feet per second is given by $s(t) = -16t^2 + 200t$, where t is the time in seconds.
 - (a) How fast is the object moving after 1 second?
 - (b) When will the object reach its maximum height and what will that maximum height be?
 - (c) When will the object hit the ground?
 - (d) During which interval of time is the speed decreasing?
- 7. Suppose that the rental price of an apartment, when x apartments are rented, is $p(x) = 2(900 + 32x x^2)$. Find the marginal revenue when 14 apartments are rented.
- 8. The demand function for a product is $p(x) = \frac{50}{\sqrt{x}}$, for $1 \le x \le 8000$, and the cost function is $C(x) = \frac{1}{2}x + 500$, for $0 \le x \le 8000$. Find the marginal profit function for the sales of this product.