HOMEWORK 2 - MATH 112

DUE DATE: Monday, September 19 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- 1. Use the limit definition of the derivative to compute the derivatives of the functions $f(x) = x^2 + 2$ and $g(x) = \frac{1}{x-3}$.
- 2. Find an equation of the tangent line to the graph of the function $f(x) = \sqrt{x+2}$ at the point (7,3).
- 3. Find the derivatives of the following functions:
 - (a) $f(x) = x^3 2x + 4$ (b) $g(x) = 4x^{-2} + 2x^2$ (c) $h(x) = (2x + 1)^2$ (d) $s(x) = (x + 4)(2x^2 - 1)$ (e) $t(x) = \frac{2x^3 - 4x^2 + 3}{x^2}$
- 4. Find an equation for the tangent line to the graph of $f(x) = \sqrt[3]{x} + \sqrt[5]{x}$ at (1, 2).
- 5. Suppose that a diver jumps from a board 12 feet high with initial velocity 16 feet per second. If the acceleration of gravity is -32 feet/second, find
 - (a) an equation describing the diver's height in terms of time;
 - (b) the diver's maximum height;
 - (c) how long it will take the diver to hit the water.
- 6. Find the derivatives of the following functions by using the product or the quotient rule as appropriate:
 - (a) $f(x) = (x^5 1)(4x^2 7x 3)$
 - (b) $g(x) = \sqrt[3]{x}(\sqrt{x}+3)$
 - (c) $h(x) = \frac{2x+5}{7x-2}$
 - (d) $k(x) = \frac{3}{x^2 + 5x + 5}$
- 7. (a) Find the equation of the tangent line to the graph of $f(x) = (x+2)(\frac{x-5}{x+1})$ at the point (0, -10).
 - (b) Find the point(s), if any, at which the graph of the equation $f(x) = \frac{x^4+3}{x^2+1}$ has a horizontal tangent line.
- 8. Use the chain rule (possibly with some other rules) to find the derivatives of the functions:

(a)
$$f(x) = \frac{1}{(x^2 - 3x)^2}$$

(b) $g(x) = \sqrt{\frac{5 - 7x}{4x}}$
(c) $h(x) = (x^2 - 9)(\sqrt{x + 2})$