HOMEWORK 3 - MATH 112

DUE DATE: Thursday, September 29
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. Compute the following derivatives:
   (a) $f(x) = \frac{3}{\sqrt[3]{x^3-1}}$
   (b) $f(x) = (\frac{x-3}{4x-1})^5$
2. Find the slope of the tangent line to the graph of $f(x) = \frac{x}{\sqrt{25+x^2}}$ at $x = 0$.
3. Find the second derivative of the functions
   (a) $f(x) = \frac{3}{4x^2}$
   (b) $f(x) = \sqrt{2x+3}$
4. Find the point(s), if any, at which the tangent line of the first derivative of the function $f(x) = x^4 - 8x^3 + 18x^2 - 16x + 2$ is horizontal.
5. Use implicit differentiation to compute the derivative $\frac{dy}{dx}$:
   (a) $2xy^3 - x^2y = 2$
   (b) $\frac{2x+y}{x-5y} = 1$
6. Find the equation of the tangent line to the graph of
   (a) $x^3 + y^3 = 2xy$ at $(1, 1)$.
   (b) $x^3 - xy + y^2 = 4$ at $(0, -2)$.
7. The radius r of a sphere is increasing at the rate of 2 inches per minute. Find the rate of change of the volume when $r = 6$ inches.
8. All edges of a cube are expanding at a rate of 3 centimeters per second. How fast is the surface area of the cube changing when each edge is 10 centimeters long?