## HOMEWORK 2 - MATH 112 DUE DATE: Monday, February 7 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 chain rule to compute the derivatives of the functions:
  - (a)  $f(x) = -7\sqrt[4]{3-5x}$
  - (b)  $f(x) = \sqrt{\frac{3-7x}{2x}}$
  - (c)  $f(x) = (\frac{4x^2}{3-x})^3$

2. Find the equation of the tangent line to the graph of fx =  $\frac{x}{\sqrt{25+x^2}}$  at the point x = 0.

3. Find the following derivatives

(a) 
$$f''(x)$$
 if  $f(x) = \frac{x+1}{x-1}$ 

(b) 
$$f'''(x)$$
 if  $f(x) = \frac{3}{16x^2}$ 

- 4. Find the point(s) where the tangent line to the graph of f'(x) is horizontal, where  $f(x) = x\sqrt{4-x^2}$ .
- 5. Compute  $\frac{dy}{dx}$  using implicit differentiation:
  - (a)  $4x^2y \frac{3}{y} = 0$ (b)  $\frac{xy - y^2}{y - x} = 1$
- 6. Find the value of the derivative  $\frac{dy}{dx}$  at the indicated point.
  - (a) x<sup>3</sup> xy + y<sup>2</sup> = 4 at (0, -2)
    (b) x<sup>3</sup> + y<sup>3</sup> = 2xy at (1, 1)
    (c) (x + y)<sup>3</sup> = x<sup>3</sup> + y<sup>3</sup> at (-1, 1)
- 7. The radius r of a sphere is increasing at a rate of 2 inches per minute. Find the rate of change of the volume when the radius in equal to a inches.
- 8. All edges of a cube are expanding at a rate of 3 centimeters per second. How fast is the surface area changing when each edge is equal to *a* centimeters?