HOMEWORK 4 - MATH 151 DUE DATE: Monday, February 16 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework 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. Find f'(x)
 - (a) $f(x) = x^3 \sin x 5 \cos x$
 - (b) $f(x) = \csc x \cot x$
 - (c) $f(x) = \sin^2 x + \cos^2 x$
- 2. Find all values in the interval $[-2\pi, 2\pi]$ at which the graph of f has a horizontal tangent line.
 - (a) $f(x) = \sin x$
 - (b) $f(x) = x + \cos x$
 - (c) $f(x) = \tan x$
 - (d) $f(x) = \sec x$
- 3. Find f'(x)
 - (a) $f(x) = \frac{4}{(3x^2 2x + 1)^3}$ (b) $f(x) = \sin(x^3)$
 - $(0) \quad f(x) = \sin(x)$
 - (c) $f(x) = \sqrt{\cos(5x)}$
 - (d) $f(x) = \cos(\cos x)$
 - (e) $f(x) = (5x+8)^{13}(x^3+7x)^{12}$
 - (f) $f(x) = (\frac{x-5}{2x+1})^3$
- 4. Find an equation for the tangent line to the graph at the specified value of x
 - (a) $f(x) = \tan(4x^2)$ at $x = \sqrt{\pi}$ (b) $f(x) = x^2\sqrt{5-x^2}$ at x = 1
- 5. Recall that $\frac{d}{dx}(|x|) = \begin{cases} 1, & \text{if } x > 0\\ -1, & \text{if } x < 0 \end{cases}$ Use this result and the chain rule to find $\frac{d}{dx}(|\sin x|)$ for nonzero x in the interval $(-\pi, \pi)$.
- 6. Find $\frac{dy}{dx}$ by implicit differentiation
 - (a) $x^2y + 3xy^3 x = 3$ (b) $\frac{1}{y} + \frac{1}{x} = 1$ (c) $\sin(x^2y^2) = x$

- 7. Use implicit differentiation to find the slope of the tangent line to the curve at the specified point.
 - (a) $x^4 + y^4 = 16$ at $(1, \sqrt[4]{15})$ (b) $2(x^2 + y^2)^2 = 25(x^2 - y^2)$ at (3, 1)
- 8. At what point(s) is the tangent line to the curve $y^2 = 2x^3$ perpendicular to the line 4x 3y + 1 = 0?