

Name: Solutions

Math 105B: Fall 2012

Quiz 4: October 31

Correct answers accompanied by incorrect or incomplete work will not receive full credit. Good Luck!

1. Find the derivative of  $f(x) = \frac{\arcsin(x^3)}{x^5}$

$$f'(x) = \frac{\frac{1}{\sqrt{1-(x^3)^2}} (3x^2) x^5 - 5x^4 \arcsin(x^3)}{(x^5)^2}$$

2. Consider the equation  $x^2y + x^4y^3 = 10x$ .

(a) Use implicit differentiation to find a formula for  $\frac{dy}{dx}$  for the equation.

$$2xy + x^2 \frac{dy}{dx} + 4x^3y^3 + x^4 3y^2 \frac{dy}{dx} = 10$$

$$\frac{dy}{dx} (x^2 + 3x^4y^2) = 10 - 2xy - 4x^3y^3$$

$$\frac{dy}{dx} = \frac{10 - 2xy - 4x^3y^3}{x^2 + 3x^4y^2}$$

(b) The point (1,2) is on the graph of the equation. Find the slope of the line tangent to the graph of the equation at the point (1,2).

$$\begin{aligned} \text{slope of tangent line} &= \left. \frac{dy}{dx} \right|_{(1,2)} = \frac{10 - 2(1)(2) - 4(1)^3(2)^3}{1^2 + 3(1)^4(2)^2} \\ &= \frac{-26}{13} = -2 \end{aligned}$$

OVER

3. Find the derivative of  $y = \ln(2 + \cos(5x))$ .

$$y' = \frac{1}{2 + \cos(5x)} (-\sin(5x)) (5)$$