

Name: Solutions

Math 105A: 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 $f(x) = \frac{\arctan(x^3)}{x^5}$

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

$$(x^5)^2$$

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.

$$\left[2xy + x^2 \frac{dy}{dx} \right] + \left[4x^3y^3 + x^4(3y^2) \frac{dy}{dx} \right] = 10$$

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

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

- (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).

slope of tangent line at (1, 2)

$$= \frac{dy}{dx} \text{ evaluated at } (1, 2)$$

$$= \frac{10 - 2(1)(2) - 4(1)^3(2)^3}{1^2 + 3(1)^4(2)^2} = \frac{-26}{13} = (-2)$$

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

$$y' = \frac{1}{2 + \sin(3x)} (\cos(3x))(3)$$