Pledge:

11/1/2011 MATH261 Calculus I Name: Solution
Dr. Lunsford Quiz 8 (40 Points Total)

I. Find the indicated derivatives. Neatly show all work, DO NOT simplify your answers, and clearly indicate your answer. (8 points each, 24 points total)

(a) $l(x) = \cos\left(4x^2\right)\arctan\left(11x\right)$

$l'(x) =$ $-\sin(4x^2)(8x)\arctan(11x) + \cos(4x^2)\left(\frac{1}{1+(11x)^2}(11)\right)$

(b) $y = \dfrac{2^w}{\ln\left(w^2+1\right)}$

$\dfrac{dy}{dw} =$ $\dfrac{\ln(2)2^w\ln(w^2+1) - 2^w\left(\frac{1}{w^2+1}(2w)\right)}{(\ln(w^2+1))^2}$

(c) $z = \log_7\left(24x^3\right) + 8\arcsin\left(xe^x\right)$

$\dfrac{dz}{dx} =$ $\dfrac{1}{\ln(7)}\cdot\dfrac{1}{24x^3}(72x^2) + 8\left(\dfrac{1}{\sqrt{1-(xe^x)^2}}(e^x + xe^x)\right)$

Pledge:

II. Use implicit differentiation to find $\frac{dy}{dx}$ assuming y is a differentiable function of x that satisfies the following equation: $x^2y^2+\sin(y)=\cos(x-y)+\sqrt[3]{x^2}$. You must neatly show all work. (8 points total)

$$2xy^2 + x^2 2y\frac{dy}{dx} + \cos(y)\frac{dy}{dx} = -\sin(x-y)\left(1-\frac{dy}{dx}\right) + \frac{2}{3}x^{-1/3}$$

$$\frac{dy}{dx} = \frac{\frac{2}{3}x^{-1/3} - 2xy^2 - \sin(x-y)}{2x^2y + \cos(y) - \sin(x-y)}$$

III. Below you are given the graph of $3x^2+4y^2=25-3xy$. Find and accurately graph the equation of the tangent line to the graph at the point $(1,2)$. (8 points)

Find slope @ $(1,2)$, i.e. $\left.\frac{dy}{dx}\right|_{(1,2)}$

$$6x + 8y\frac{dy}{dx} = -3y - 3x\frac{dy}{dx}$$

Plug in $(1,2)$:

$$6 + 16\frac{dy}{dx} = -6 - 3\frac{dy}{dx}$$

$$19\frac{dy}{dx} = -12 \Rightarrow \left.\frac{dy}{dx}\right|_{(1,2)} = -\frac{12}{19}$$

$$y-2 = -\frac{12}{19}(x-1)$$

$$y = -\frac{12}{19}x + \frac{50}{19}$$

Note $\frac{50}{19} \approx 2.63$