Name_____ October 11, 2016

Quiz 4

1. Differentiate

   (a) $y = \ln(x^2 + 1)$

   (b) $y = \ln(\ln x)$

2. Find dy/dx and dx/dy by implicit differentiation

$$y \cos x = x^2 + y^2$$

1) (a) $y = \ln(x^2+1)$

$$y' = \frac{(x^2+1)'}{x^2+1} = \frac{2x}{x^2+1}$$

(b) $y = \ln(\ln x)$

$$y' = \frac{(\ln x)'}{\ln x} = \frac{\frac{1}{x}}{\ln x} = \frac{1}{x \ln x}.$$

2) $y\cos x = x^2 + y^2$

Differentiate both sides with respect to x:

$$y'\cos x - y\sin x = 2x + 2yy'$$

$$\Rightarrow \quad y'(\cos x - 2y) = 2x + y\sin x$$

$$\Rightarrow \quad \boxed{\frac{dy}{dx} = y' = \frac{2x + y\sin x}{\cos x - 2y}}$$

Differentiate both sides with respect to y:

$$\cos x - yx'\sin x = 2xx' + 2y$$

$$\Rightarrow \quad \cos x - 2y = (2x + y\sin x)x'$$

$$\Rightarrow \quad \boxed{\frac{dx}{dy} = x' = \frac{\cos x - 2y}{2x + y\sin x}}$$