(this is more work than you need to show. I just wanted to make clear where things were coming from)

Quiz 7

NAME:
PERM:
SECTION: T 8 AM / T 4 PM / T 5 PM / T 6 PM / TH 6 PM

1. Let $f(x) = e^{xsin(2x)}$. Find $f'(x)$.

$$f'(x) = \frac{d}{dx}\left[e^{x\sin(2x)}\right]$$

$$= e^{x\sin(2x)} \cdot \frac{d}{dx}(x\sin(2x)) \quad \text{(chain rule)}$$

$$= e^{x\sin(2x)}\left((1)\sin(2x) + x\cdot\cos(2x)\cdot\frac{d}{dx}(2x)\right) \quad \text{(product and chain rule)}$$

$$= \boxed{e^{x\sin(2x)}\left[\sin 2x + 2x\cos(2x)\right]}$$

2. If $x^2 + xy + y^2 = 4$, find dy/dx.

$$\frac{d}{dx}\left[x^2 + xy + y^2 = 4\right]$$

(product rule)

$$\rightarrow 2x + x\cdot\frac{dy}{dx} + (1)y + 2y\cdot\frac{dy}{dx} = 0$$

$$\rightarrow x\cdot\frac{dy}{dx} + 2y\cdot\frac{dy}{dx} = -2x - y$$

$$\rightarrow \frac{dy}{dx}(x+2y) = -2x - y \rightarrow \boxed{\frac{dy}{dx} = \frac{-2x-y}{x+2y}}$$

3. If $y = (log_2 x)^x$, find y'.
(Hint: $d/dx(log_a x) = \frac{1}{x\ln a}$)

$$y = (\log_2 x)^x$$

$$\rightarrow \ln y = \ln\left((\log_2 x)^x\right)$$

$$\rightarrow \ln y = x\ln(\log_2 x)$$

$$\rightarrow \frac{1}{y}\cdot y' = (1)\ln(\log_2 x) + x\cdot\frac{d}{dx}\left[\ln(\log_2 x)\right] \quad \text{(product rule)}$$

$$\rightarrow y' = y\left[\ln(\log_2 x) + x\left(\frac{1}{\log_2(x)\cdot x\ln 2}\right)\right] \rightarrow \boxed{y' = (\log_2 x)^x\left[\ln(\log_2 x) + \frac{1}{\log_2 x\cdot\ln 2}\right]}$$

$$\frac{d}{dx}\left[\ln(\log_2 x)\right] = \frac{1}{\log_2 x}\cdot\frac{d}{dx}(\log_2 x) \quad \text{(chain rule)}$$

$$= \frac{1}{\log_2 x}\cdot\frac{1}{x\ln 2}$$