Quiz #3 Math 1131 10/21/2013

Name: Key Section: _____

15

You have [redacted] minutes to complete the quiz. Please **show all work**, and then **write your answer on the line provided.**

1. Let $f(x) = x^2(1-2x)$. Find $f'(x)$.

$$f'(x) = \frac{d}{dx}\left(x^2(1-2x)\right) = \frac{d}{dx}\left(x^2 - 2x^3\right) = 2x - 6x^2$$

1 pt

Answer: $2x - 6x^2$

2. Let $f(x) = \sqrt{x^2 + e^x}$. Find $f'(x)$.

$$f'(x) = \frac{d}{dx}\left[(x^2+e^x)^{\frac{1}{2}}\right] = \frac{1}{2}\left(x^2+e^x\right)^{-\frac{1}{2}} \frac{d}{dx}(x^2+e^x)$$

$$= \frac{1}{2}\left(x^2+e^x\right)^{-\frac{1}{2}}\left(2x+e^x\right)$$

1 pt

Answer: $\dfrac{2x+e^x}{2\sqrt{x^2+e^x}}$

3. (2 points). Let $f(x) = x \cdot \tan(e^x)$. Find $f'(x)$.

$$f'(x) = \frac{d}{dx}\left(x \cdot \tan(e^x)\right) = x \cdot \sec^2(e^x) \cdot e^x + \tan(e^x)$$

$$= x \frac{d}{dx}\left(\tan(e^x)\right) + \tan(e^x) \cdot \frac{d}{dx}(x) \quad \leftarrow \text{1 pt}$$

$$= x \cdot \sec^2(e^x) \cdot \frac{d}{dx} e^x + \tan(e^x) \quad \leftarrow \text{1 pt}$$

Answer: $x \cdot \sec^2(e^x) \cdot e^x + \tan(e^x)$

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4. (2 points). Let $f(x) = \ln\left(x^2 \cdot e^x\right)$. Find $f'(x)$.

$\ln(ab) = \ln(a) + \ln(b)$

1 pt

$f'(x) = \frac{d}{dx}\left(\ln(x^2 \cdot e^x)\right) = \frac{d}{dx}\left(\ln(x^2) + \ln(e^x)\right)$

1 pt

$= \frac{d}{dx}\left(2\ln(x) + [redacted]x\right) = 2 \cdot \frac{1}{x} + 1$

Answer: $\frac{2}{x} + 1$

5. (2 points). Suppose that $x \sin y$ [redacted] $= 1$. Find $\frac{dy}{dx}$.

$\frac{d}{dx}\left(x \cdot \sin y\ [redacted]\right) = \frac{d}{dx}(1)$

$x \cdot \frac{d}{dx}(\sin(y)) + \sin(y) \cdot \frac{d}{dx}(x) = 0$

1 pt

$x \cdot \cos(y)\frac{dy}{dx} + \sin(y) = 0$

1 pt

$x \cdot \cos(y)\frac{dy}{dx} = -\sin(y)$

$\frac{dy}{dx} = \frac{-\sin(y)}{x\cos(y)} = \frac{-\tan(y)}{x}$

Answer: _____

6. (2 points). Let $f(x) = (2x)^{4x}$. Find $f'(x)$.

$y = (2x)^{4x}$

$\ln(y) = \ln\left((2x)^{4x}\right)$

1 pt

$\ln(y) = 4x \cdot \ln(2x)$

$\frac{d}{dx}\ln(y) = \frac{d}{dx}\left(4x \cdot \ln(2x)\right)$

1 pt

$\frac{1}{y} \cdot y' = 4x \cdot \frac{1}{2x} \cdot 2 + \ln(2x) \cdot 4 = 4 + 4 \cdot \ln(2x)$

Answer: _____

$y' = y(4 + 4\ln(2x)) = (2x)^{4x}(4 + 4\ln(2x))$