

Name: _____

Key

Section: _____

You have 12 minutes to complete the quiz. Please show all work, and then circle your answer.

1. Let $f(x) = \ln(\sin(x^2))$. Find $f'(x)$.

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

outside = $\ln(u) \Rightarrow (\text{outside})' = \frac{1}{u}$

$$= \frac{1}{\sin(x^2)} \cdot \frac{d}{dx} [\sin(x^2)]$$

outside = $\sin(u)$

$$= \frac{1}{\sin(x^2)} \cdot \cos(x^2) \cdot \frac{d}{dx} [x^2]$$

$$= \frac{\cos(x^2) \cdot (2x)}{\sin(x^2)}$$

2. Suppose that $x^4 + y^4 = e^y$. Find y' .

① take deriv of both sides

$$\frac{d}{dx} [x^4] + \frac{d}{dx} [y^4] = \frac{d}{dx} [e^y]$$

$$4x^3 + 4y^3 \cdot y' = e^y \cdot y'$$

② collect y' terms

$$4x^3 = e^y \cdot y' - 4y^3 \cdot y'$$

③ factor & solve

$$4x^3 = (e^y - 4y^3) y'$$

$$y' = \frac{4x^3}{e^y - 4y^3}$$

Name: _____

Section: _____

3. Let $f(x) = x^{x^2}$. Find $f'(x)$. Note: $f(x) = x^{(x^2)}$.

↑ too hard!

① take $y = x^{(x^2)}$
ln of both sides & break apart
 $\ln(y) = \ln(x^{(x^2)})$

1pt $\ln(y) = x^2 \cdot \ln(x)$

② take deriv. of both sides

$$\frac{d}{dx}[\ln(y)] = \frac{d}{dx}[x^2 \cdot \ln(x)]$$

outside = $\ln(x)$

$$\frac{1}{y} \cdot y' = x^2 \cdot \frac{d}{dx}[\ln(x)] + \ln(x) \cdot \frac{d}{dx}[x^2]$$

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

③ answer the question

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

1pt $f'(x) = x^{(x^2)} \cdot (x + 2x \cdot \ln(x))$