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Quiz 10 🌑

MATH 200 September 24, 2024

Directions: Differentiate the following functions.

1. 
$$y = \sec(x^{5}) + \sec^{5}(x) = \sec(x^{5}) + (\sec(x))^{5}$$
  
 $\frac{dy}{dx} = \sec(x^{5}) + \tan(x^{5}) + 5(\sec(x))^{4} + \sec(x) + \sec(x) + \tan(x)$   
 $= (5 \times x^{4} \sec(x^{5}) + \tan(x^{5}) + 5 \sec^{5}(x) + \tan(x)$ 

2. 
$$y = \left(\frac{x^3 - x^2}{\sin(x)}\right)^4$$

$$\frac{dy}{dx} = \left[4\left(\frac{x^3 - \chi^2}{\sin(x)}\right)^3 \frac{(3x^2 - 2x)\sin(x) - (x^3 - \chi^2)\cos(x)}{\sin^2(x)}\right]$$

3. 
$$y = \frac{2}{x^4 - 3x^3} = 2(x^4 - 3x^3)$$

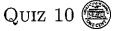
$$\frac{dy}{dx} = -2(x^4 - 3x^3)^2 (4x^3 - 9x^2) = \frac{18x^2 - 8x^3}{(x^4 - 3x^3)^2}$$

4. 
$$y = x^{5} - \sqrt{\tan(x^{3})} = x^{5} - (\tan(x^{3}))^{\frac{1}{2}}$$

$$\frac{dy}{dx} = 5x^{4} - \frac{1}{2}(\tan(x^{3}))^{\frac{1}{2}}D_{x}[\tan(x^{3})]$$

$$= \sqrt{5x^{4} - \frac{\sec^{2}(x^{3})}{2\sqrt{\tan(x^{3})}}}$$

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**Directions:** Differentiate the following functions.

$$1. y = e^{\cos(x)} + \cos(e^x)$$

$$\frac{dy}{dx} = e^{\cos(x)}(-\sin(x)) - \sin(e^{x})e^{x}$$

$$= [-\sin(x)e^{\cos(x)} - \sin(x)e^{x}]$$

2. 
$$y = (x^2 + 3x - 4)^{100}$$

$$\frac{dy}{dx} = \frac{100(x^2+3x-4)^{99}(2x+3)}{(2x+3)}$$

3. 
$$y = \frac{2}{5}\sqrt{e^{5x} + 5x} = \frac{2}{5}\left(e^{5x} + 5x\right)^{\frac{1}{2}}$$

$$\frac{dy}{dx} = \frac{2}{5} \cdot \frac{1}{2} \left( e^{5x} + 5x \right)^{-\frac{1}{2}} \left( e^{5x} + 5 \right) = \frac{5x}{10^{5x} + 5x}$$

$$= \frac{1}{5} \frac{1}{(e^{5x} + 5x)^{\frac{1}{2}}} \frac{5(e^{5x} + 1)}{5(e^{5x} + 5x)^{\frac{1}{2}}} = \frac{1}{\sqrt{5x} + 5x}$$

4. 
$$y = x^4 + \left(e^x + \frac{x^3 - 1}{x + 1}\right)^4$$

$$\frac{dy}{dx} = 4\chi^{3} + 4\left(e^{x} + \frac{\chi^{3} - 1}{\chi + 1}\right) \sum_{x=1}^{3} \left(e^{x} + \frac{\chi^{3} + 1}{\chi + 1}\right)$$

$$= \left| 4\chi^{3} + 4\left(e^{\chi} + \frac{\chi^{3}-1}{\chi+1}\right)^{3} \left(e^{\chi} + \frac{3\chi^{2}(\chi+1) - (\chi^{3}+1)\cdot 1}{(\chi+1)^{2}}\right) \right|$$