Name: Richard

QUIZ 8

MATH 200
September 19, 2023

1. Find the derivative of $f(x) = x + \cos(x) - \sec(x)$.

$$f'(x) = 1 - \sin(x) - \sec(x)\tan(x)$$

2. Find the derivative of $w = e^z + z^3 \sin(z)$.

$$\frac{dw}{dz} = e^z + 3z^2\sin(z) + z^3\cos(z)$$

3. Find the derivative of $g(x) = \dfrac{4x^3 - x + 2}{3x + 1}$.

$$g'(x) = \frac{(12x^2 - 1)(3x+1) - (4x^3 - x + 2)\cdot 3}{(3x+1)^2}$$

$$= \frac{36x^3 + 12x^2 - 3x - 1 - 12x^3 + 3x - 6}{(3x+1)^2} = \frac{24x^3 + 12x^2 - 7}{(3x+1)^2}$$

4. This problem asks you to find the derivative of $\dfrac{x^5 - 1}{3}$ in two ways.

(a) Use the **constant multiple rule** as your first step:

$$D_x\left[\frac{x^5-1}{3}\right] = \frac{1}{3}D_x\left[x^5 - 1\right] = \frac{1}{3}(5x^4 - 0) = \frac{5x^4}{3}$$

(b) Use the **quotient rule** as your first step:

$$D_x\left[\frac{x^5-1}{3}\right] = \frac{(5x^4 - 0)3 - (x^5 - 1)0}{3^2} = \frac{15x^4}{9} = \frac{5x^4}{3}$$

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1. Find the derivative of $f(x) = x^3 + \tan(x) + \sin(x)$.

$$f'(x) = \boxed{3x^2 + \sec^2(x) + \cos(x)}$$

2. Suppose $y = \dfrac{\sec(x)}{x^2+1}$. Find: $\dfrac{dy}{dx} = \dfrac{\sec(x)\tan(x)(x^2+1) - \sec(x)\,2x}{(x^2+1)^2}$

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

3. Suppose $z = e^w \cos(w)$. Find: $z' = e^w\cos(w) + e^w(-\sin(w))$

$$= \boxed{e^w\left(\cos(w) - \sin(w)\right)}$$

4. This problem asks you to find the derivative of $\dfrac{x^5-1}{3}$ in two ways.

(a) Use the **quotient rule** as your first step:

$$D_x\left[\frac{x^5-1}{3}\right] = \frac{(5x^4-0)\,3 - (x^5-1)\cdot 0}{3^2} = \frac{5x^4 \cdot 3}{3\cdot 3} = \boxed{\frac{5x^4}{3}}$$

(b) Use the **constant multiple rule** as your first step:

$$D_x\left[\frac{x^5-1}{3}\right] = \frac{1}{3}D_x\left[x^5 - 1\right] = \frac{1}{3}5x^4 = \boxed{\frac{5x^4}{3}}$$