Name: ______________________________

Quiz 8

MATH 200
February 15, 2022

1. Find the indicated derivatives.

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

   $$\frac{d}{dx}\left[\frac{x^5-1}{3}\right] = \frac{(5x^4-0)\cdot 3-(x^5-1)\cdot 0}{3^2} = \frac{5x^4\cdot 3}{9} = \boxed{\frac{5x^4}{3}}$$

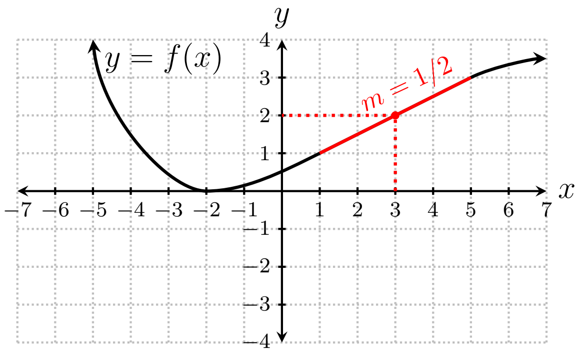
   (b) Use the **constant multiple rule** as your first step to find:

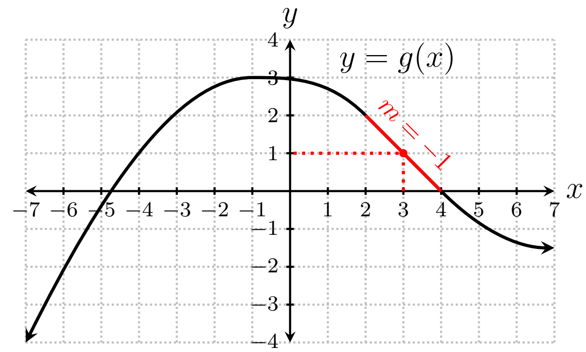
   $$\frac{d}{dx}\left[\frac{x^5-1}{3}\right] = \frac{d}{dx}\left[\frac{1}{3}\left(x^5-1\right)\right] = \frac{1}{3}\cdot\frac{d}{dx}\left[x^5-1\right] = \frac{1}{3}(5x^4-0) = \boxed{\frac{5x^4}{3}}$$

2. Suppose $z = e^w\cos(w)$. Find: $z' = e^w\cos(w) + e^w(-\sin(w)) = \boxed{e^w\cos(w) - e^w\sin(w)}$

3. Suppose $y = \dfrac{\sec(x)}{x^2+1}$. Find: $\dfrac{dy}{dx} = \dfrac{\sec(x)\tan(x)(x^2+1) - \sec(x)(2x+0)}{\left(x^2+1\right)^2} = \boxed{\dfrac{\sec(x)\Big(\tan(x)(x^2+1)-2x\Big)}{\left(x^2+1\right)^2}}$

4. Two functions $f(x)$ and $g(x)$ are graphed below. Suppose $h(x) = f(x)g(x)$. Find $h'(3)$.





By product rule, $h'(3) = f'(3)g(3) + f(3)g'(3) = \frac{1}{2}\cdot 1 + 2\cdot(-1) = \frac{1}{2} - 2 = \boxed{-\frac{3}{2}}$

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Quiz 8

MATH 200
February 15, 2022

1. Find the indicated derivatives.

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

   $$\frac{d}{dx}\left[\frac{x^2+x}{5}\right] = \frac{d}{dx}\left[\frac{1}{5}\left(x^2+x\right)\right] = \frac{1}{5}\cdot\frac{d}{dx}\left[x^2+x\right] = \frac{1}{5}(2x+1) = \boxed{\frac{2x+1}{5}}$$

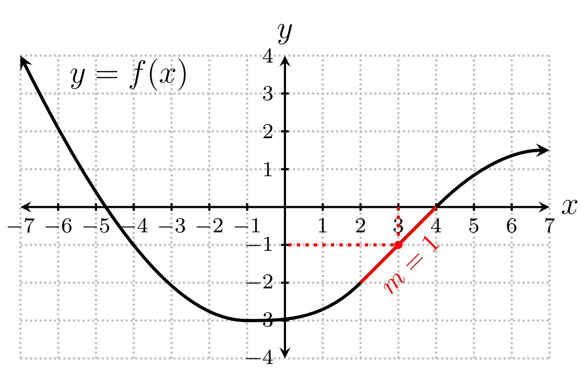
   (b) Use the **quotient rule** as your first step to find:

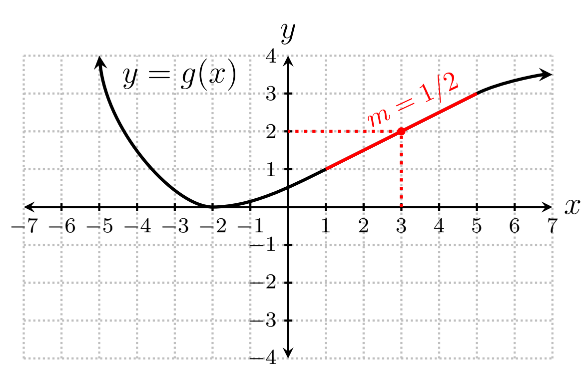
   $$\frac{d}{dx}\left[\frac{x^2+x}{5}\right] = \frac{(2x+1)\cdot 5-(x^2+x)\cdot 0}{5^2} = \frac{(2x+1)\cdot 5}{25} = \boxed{\frac{2x+1}{5}}$$

2. Suppose $y = \tan(x)\,e^x$. Find: $y' = \boxed{\sec^2(x)e^x + \tan(x)e^x}$

3. Suppose $z = w^5\sin(w) + \sec(w)$. Find: $\dfrac{dz}{dw} = \boxed{5w^4\sin(w) + w^5\cos(w) + \sec(w)\tan(w)}$

4. Two functions $f(x)$ and $g(x)$ are graphed below. Suppose $h(x) = \dfrac{f(x)}{g(x)}$. Find $h'(3)$.





By quotient rule, $$h'(3) = \frac{f'(3)g(3)-f(3)g'(3)}{g(3)^2} = \frac{1\cdot 2-(-1)\cdot\frac{1}{2}}{2^2} = \frac{2+\frac{1}{2}}{4} = \frac{\frac{5}{2}}{4} = \boxed{\frac{5}{8}}$$