

Math 31 - Quiz 1.3 - PRSD VC

February 27 2019

Name _____

$$\left(\frac{f(x)}{g(x)}\right)' = \frac{g(x)f'(x) - g'(x)f(x)}{(g(x))^2} \quad | \quad (f(g(x)))' = f'(g(x))g'(x) \text{ or } \frac{dy}{dx} = \frac{dy}{du} \frac{du}{dx}$$

Find the derivatives of the following. You do **not** need to simplify. No marks will be awarded on this quiz for simplification. 3 marks for each question for a total of 6 marks.

1. $f(x) = \left(\frac{x^2 + 4}{2x - 3}\right)^5$

Solution:

$$\begin{aligned} f'(x) &= 5 \left(\frac{x^2 + 4}{2x - 3}\right)^4 \frac{(2x - 3)(2x) - (x^2 + 4)(2)}{(2x - 3)^2} && \text{full marks} \\ &= \frac{5(x^2 + 4)^4}{(2x - 3)^4} \cdot \frac{4x^2 - 6x - 2x^2 - 8}{(2x - 3)^2} \\ &= \frac{5(x^2 + 4)^4(2x^2 - 6x - 8)}{(2x - 3)^6} \\ &= \frac{10(x^2 + 4)^4(x^2 - 3x - 4)}{(2x - 3)^6} \end{aligned}$$

2. $g(x) = \frac{\sqrt{5x + 4}}{x^2 - 6}$

Solution:

$$\begin{aligned} g'(x) &= \frac{(x^2 - 6) \cdot \frac{1}{2}(5x + 4)^{-\frac{1}{2}}(5) - (2x)\sqrt{5x + 4}}{(x^2 - 6)^2} && \text{full marks} \\ &= \frac{5(x^2 - 6)(5x + 4)^{-\frac{1}{2}} - 4x\sqrt{5x + 4}}{2(x^2 - 6)^2} \\ &= \frac{5(x^2 - 6) - 4x(5x + 4)}{2(x^2 - 6)^2\sqrt{5x + 4}} \\ &= \frac{5x^2 - 30 - 20x^2 - 16x}{2(x^2 - 6)^2\sqrt{5x + 4}} \\ &= \frac{-15x^2 - 16x - 30}{2(x^2 - 6)^2\sqrt{5x + 4}} \end{aligned}$$