Product and Quotient Rule Practice (DO NOT WRITE ON THIS PAPER)

Learning how to apply the product rule and quotient rule is essential in computing derivatives correctly in this course. Visit hunkim.com/13 for more Calculus 12 resources.

- Product rule
- Quotient rule

1. Product Rule Practice – Differentiate:
   a. $y = \sqrt[3]{x^2}(2x - x^2)$
      i. By expanding
      ii. Using the Product Rule: $f'g + g'f$

   b. $P(x) = (6x^3 - x)(10 - 20x)$
      i. By expanding
      ii. Using the Product Rule: $f'g + g'f$

2. $f(x) = e^x \cdot \sin x$. Find $f'(x)$

3. $y = \sin x\,(x^2)$

4. $y = e^x x^3$

5. $y = \ln x \cos x$

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

7. $y = 2^x \ln x$. Find y'

8. Find the derivative of $h(t) = \left(2\sqrt{t}\right) \cdot \sec t$

9. $y = 2x \arcsin x$

10. $f(x) = \left(\tan^{-1} x\right) \cdot \tan x$
    Evaluate $f'\left(\frac{\pi}{4}\right)$

11. The Quotient Rule is derived in a similar manner to proving the Product Rule. State the Quotient Rule.

12. $W(z) = \frac{3z+9}{2-z}$

13. $h(x) = \frac{4\sqrt{x}}{x^2-2}$

14. $y = \frac{w^6}{5}$

15. $y = \frac{\log_2 x}{e^x}$

16. $y = \frac{2^x}{\tan x}$

17. $y = \frac{\sec x}{\tan^{-1} x}$

18. $y = \frac{\ln x}{\pi \tan x}$

Challenge

19. A classmate claims that $(f \cdot g)' = f' \cdot g'$ for any functions f and g. Show an example that proves your classmate wrong.

20. Enrichment: Where does the Product Rule $(fg)' = f'g + g'f$ come from?