

Product & Quotient Rule Assignment

❖ Power Rule: $\frac{d}{dx}[a \cdot x^n] =$ _____

❖ Product Rule: $\frac{d}{dx}[f(x) \cdot g(x)] =$ _____

❖ Quotient Rule: $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] =$ _____

1. If $f(x) = (x^2 - 2)(4x + 3)$, then $f'(x) =$ _____

2. If $f(x) = (x^2 - 2)(4x + 3)$, then $f''(x) =$ _____

3. Let $y = (2x^3 + 5)(7x - 3)$. Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$

4. For $f(x) = \frac{x^2 + 5x - 9}{x + 2}$, $f'(x) =$ _____

5. Differentiate the following without using the product or quotient rule.

A. $g(x) = (x^2 + 3x - 8)(5x + 1)$

B. $h(x) = \frac{x^2 - 16}{x - 4}$

❖ For questions 6 – 11, differentiate each function.

6. $g(x) = \frac{12x^2 - 6}{6}$

7. $p(x) = \frac{x^3 + 7x^2 - 9x}{x}$

8. $h(t) = \frac{1}{t^2}(t^3 - 4t^2)$

9. $f(t) = \sqrt{t}(t - 7)$

10. $f(x) = (x^2 + c)(x^2 + 3c)$
(Where c is a constant)

11. $g(x) = \frac{x^2 + c}{x^2 - c}$
(Where c is a constant)

12. Find the equation of the line tangent to the graph of $f(x) = \frac{2x+6}{2x}$ at $(-1, -2)$.

13. Find the equation of the line normal to the graph of $f(x) = \frac{2x+6}{2x}$ at $(-1, -2)$.

14. Find the x -value(s) at which the graph of $f(x) = (2x - 1)(x^2 + 3)$ has a tangent line parallel to
The graph of $y = 6x - 5$.

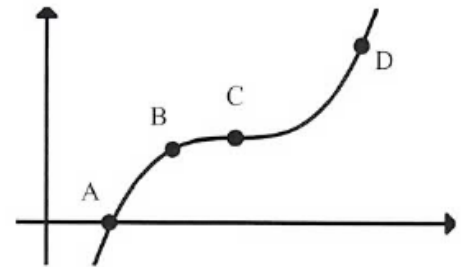
15. Given $h(x) = x \cdot f(x)$:

A. $h'(x) =$ _____

B. If $f(3) = 5$ and $f'(3) = -8$, find $h'(3)$ _____

16. For $f(x) = \frac{x^2 - k^2}{x^2 + k^2}$, find $f'(2)$, where k is a constant. _____

17. Given the graph of the function below, which is greater – the average rate of change between points A and B or the instantaneous rate of change at B? Justify your answer.



❖ Use the table of selected values below to answer questions 18 – 22.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	-4	2	8	5
7	5π	7	-3	-6

18. If $h(x) = f(x) \cdot g(x)$, find $h'(3)$. _____

19. If $b(x) = 5 \cdot f(x) - \frac{1}{3} \cdot g(x)$, find $b'(3)$. _____

20. If $p(x) = \frac{f(x)}{g(x)}$, find $p'(7)$. _____

21. If $d(x) = \frac{f(x)}{g(x)}$, find $d'(3)$. _____

22. If $r(x) = \frac{g(x)}{f(x)}$, find $r'(3)$. _____

23. Find all values of x at which the function $y = \frac{x^2 + 11}{x + 5}$ has horizontal tangents.

24. Given the table below, if $h(x) = (3 + f(x))(5 - g(x))$, then $h'(2) =$ _____

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	-3	2	3	6

25. For the graphs of $f(x)$ and $g(x)$ below on the right, with

$$h(x) = f(x) \cdot g(x), p(x) = \frac{g(x)}{f(x)}, m(x) = \frac{f(x)}{g(x)} \text{ find:}$$

$$h'(3) = \text{_____} \quad h'(4) = \text{_____} \quad m'(5) = \text{_____} \quad p'(0) = \text{_____}$$

