

Product Rule

$$h(x) = f \cdot g$$

$$h'(x) =$$

Find the derivative of each function.

1. $f(x) = 8x \sin x$

2. $g(x) = 2e^x(\sqrt{x})$

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

The table below shows values of two differentiable functions f and g , as well as their derivatives.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	4	-2	-1	2
-5	3	4	-2	5

4. $h(x) = 3f(x)g(x)$
Find $h'(2)$.

5. $r(x) = \left(\frac{f(x)}{2} + 2\right)(3 - g(x))$
Find $r'(-5)$.

Find the derivative of each function.

1. $f(x) = (2x - 3) \sin x$

2. $g(x) = 2x^3 e^x$

3. $h(x) = 4\sqrt{x} \ln x$

4. $f(x) = (4 - 5x) \cos x$

5. $g(x) = 6 \ln x \sin x$

6. $h(x) = 2e^x(x^2 + x)$

Quotient Rule

$$h(x) = \frac{f}{g}$$

$$h'(x) =$$

Find the derivative of each function.

1. $y = \frac{2x^2}{3x+1}$

2. $g(x) = \frac{3e^x}{2x}$

3. $h(x) = \frac{\sin x}{2x^2-5}$

4. $h(x) = \frac{3x+1}{2x^2}$

The table below shows values of two differentiable functions f and g , as well as their derivatives.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	4	-2	-1	2

5. $h(x) = \frac{f(x)}{3g(x)}$
Find $h'(2)$.

6. $r(x) = -\frac{g(x)}{1-f(x)}$
Find $r'(2)$.

Find the derivative of each function.

1. $h(x) = \frac{4x-1}{3x+2}$

2. $g(x) = \frac{\sin x}{x}$

3. $h(x) = \frac{x^3+2x^2-x}{2x}$

Product and Quotient Rule Practice Problems:

13.

x	$d(x)$	$d'(x)$	$h(x)$	$h'(x)$
1	-3	-2	4	3

a. $a(x) = d(x)h(x)$
Find $a'(1)$.

b. $b(x) = -d(x)h(x)$
Find $b'(1)$.

c. $c(x) = \left(2 - \frac{d(x)}{2}\right)(6 - h(x))$
Find $c'(1)$.

Find the equation of the tangent line at the given x -value.

14. $f(x) = 8 \sin x \cos x$ at $x = \frac{\pi}{3}$

14b) $g(x) = -2xe^x$ at $x = 0$

15. What is the instantaneous rate of change at $x = 4$ of the function $f(x) = \frac{x^2-1}{x-2}$?

(A) $-\frac{15}{2}$

(B) $\frac{1}{4}$

(C) $\frac{1}{2}$

(D) $\frac{15}{2}$

16. Let f and g be differentiable functions with the following properties:

I. $f(x) < 0$ for all x

II. $g(5) = 2$

If $h(x) = \frac{f(x)}{g(x)}$ and $h'(x) = \frac{f'(x)}{g(x)}$, then $g(x) =$

(A) $\frac{1}{f'(x)}$

(B) $f(x)$

(C) $-f(x)$

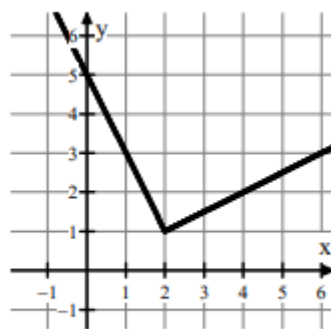
(D) 0

(E) 2

17. The function f is defined by $f(x) = \frac{x}{x+4}$. What points (x, y) on the graph of f have the property that the line tangent to f at (x, y) has a slope of $\frac{1}{9}$?

- (A) $(2, \frac{1}{3})$ only (B) $(\frac{1}{9}, \frac{1}{13})$ only (C) $(2, \frac{1}{3})$ and $(-10, \frac{5}{3})$
 (D) $(2, \frac{1}{3})$ and $(-2, -1)$ (E) There are no such points.

18. The graph of a function f is shown to the right. Let $g(x) = \frac{x^2-1}{f(x)}$. What is the value of $g'(4)$?



Graph of f

19. The graphs of f and g are shown to the right. If $h(x) = 4f(x)g(x)$, then $h'(1) =$

- (A) -22
 (B) -4
 (C) 0
 (D) 4
 (E) 46

