2.9 The Quotient Rule

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 $r'(2)$.

2.9 The Quotient Rule
Calculus

Find the derivative of each function.

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

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

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

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

5. $f(x) = \dfrac{3x^4-2x^2-3\sqrt{x}}{x}$

6. $g(x) = \dfrac{2x^5}{\cos x}$

7. $f(x) = \dfrac{e^x}{4\sin x}$

8. $f(x) = \dfrac{2x+4}{3x+2}$

9. $g(x) = \dfrac{x^3+3x^2-x}{x^2}$

Use the table to find the value of the derivatives of each function.

10.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
7	-5	3	2	-3

a. $h(t) = \dfrac{5f(x)}{g(x)}$

Find $h'(7)$.

b. $m(x) = \dfrac{g(x)+2}{3f(x)}$

Find $m'(7)$.

11.

t	$a(t)$	$a'(t)$	$b(t)$	$b'(t)$
-4	2	-3	-4	1

a. $f(t) = -\dfrac{b(t)}{3a(t)}$

Find $f'(-4)$.

b. $g(t) = \dfrac{1-a(t)}{2b(t)+3}$

Find $g'(-4)$.

12.

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

a. $g(x) = \dfrac{d(x)}{2h(x)}$

Find $g'(1)$.

b. $f(x) = \dfrac{2-\frac{d(x)}{2}}{6-h(x)}$

Find $f'(1)$.

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

13. $f(x) = \dfrac{\sin x}{\cos x}$ at $x = \dfrac{\pi}{3}$

14. $g(x) = -\dfrac{2x}{e^x}$ 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) $\frac{15}{2}$

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

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

         II. $g(5) = 2$
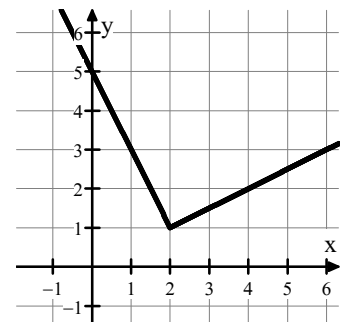
     If $h(x) = \frac{f(x)}{g(x)}$ and $h'(x) = \frac{f'(x)}{g(x)}$, then $g(x) =$

    (A) $\frac{1}{f'(x)}$ (B) $f(x)$ (C) $-f(x)$ (D) 0   (E) 2

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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) $\left(2, \frac{1}{3}\right)$ only   (B) $\left(\frac{1}{9}, \frac{1}{13}\right)$ only   (C) $\left(2, \frac{1}{3}\right)$ and $\left(-10, \frac{5}{3}\right)$

    (D) $\left(2, \frac{1}{3}\right)$ and $(-2, -1)$ (E) There are no such points.

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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