5 Product/Quotient Rules 1
Work in your Calculus Notebook!

Use the product rule to find the derivative.

1. $g(x)=(x^2+1)(2x-1)$
2. $h(t)=3t(t^2+4)$
3. $f(x)=x^3\cos x$

Use the quotient rule to find the derivative.

4. $f(x)=\dfrac{x}{x^2+1}$
5. $h(x)=\dfrac{\sqrt[3]{x}}{x^3+1}$
6. $g(x)=\dfrac{\sin x}{x^2}$

Find $f'(c)$ for the given value of c.

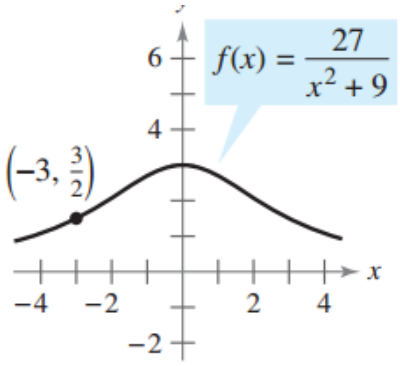
7. $f(x)=(x^3-3x)(2x^2+3x+5)$; $c=0$
8. $f(x)=\dfrac{x^2-4}{x-3}$; $c=1$
9. $f(x)=x\cos x$; $c=\dfrac{\pi}{4}$

Find the derivative **WITHOUT** using the quotient rule.

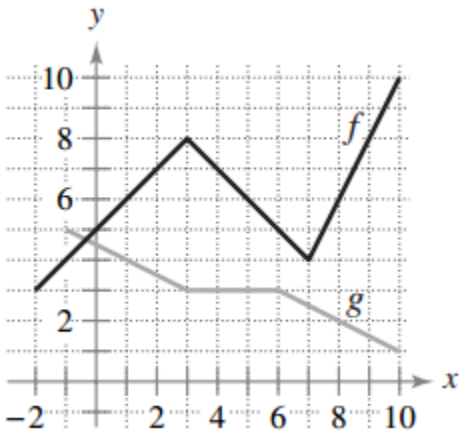
10. $y=\dfrac{x^2+2x}{3}$
11. $y=\dfrac{7}{3x^3}$
12. $y=\dfrac{4x^{3/2}}{x}$

Find the derivative with the BEST method.

13. $f(x)=x\left(1-\dfrac{4}{x+3}\right)$
14. $f(x)=\dfrac{2x+5}{\sqrt{x}}$
15. $h(s)=(s^3-2)^2$
16. $f(x)=(3x^3+4x)(x-5)(x+1)$
17. $f(t)=t^2\sin t$
18. $f(t)=\dfrac{\cos t}{t}$
19. Find the equation of the tangent line at the point shown.



20. Use the graph of f and g if $p(x)=f(x)g(x)$ and $q(x)=\dfrac{f(x)}{g(x)}$ to find each.
    a. $p'(1)$
    b. $q'(4)$



Answers

1. $g(x)=6x^2-2x+2$
2. $h'(t)=9t^2+12$
3. $f'(x)=3x^2\cos x-x^3\sin x$
4. $f'(x)=\dfrac{1-x^2}{\left(x^2+1\right)^2}$
5. $h'(x)=\dfrac{1-8x^3}{3x^{2/3}\left(x^3+1\right)^2}$
6. $g'(x)=\dfrac{x\cos x-3\sin x}{x^3}$
7. -15
8. -1/4
9. $\dfrac{\sqrt{2}}{2}-\dfrac{\pi\sqrt{2}}{8}$
10. $y'=\dfrac{2}{3}x+\dfrac{2}{3}$
11. $y'=\dfrac{-7}{x^4}$
12. $y'=\dfrac{2}{\sqrt{x}}$
13. $f'(x)=\dfrac{x^2+6x-3}{(x+3)^2}$
14. $f'(x)=\dfrac{1}{\sqrt{x}}-\dfrac{5}{2x^{3/2}}$
15. $h'(s)=6s^2\left(s^3-2\right)$
16. $f'(x)=15x^4-48x^3-33x^2-32x-20$
17. $f'(t)=t(t\cos t+2\sin t)$
18. $f'(t)=\dfrac{-t\sin t-\cos t}{t^2}$
19. $y-\frac{3}{2}=\frac{1}{2}(x+3)$
20. -
    a. 1
    b. -1/3