7 - CHAIN, Product/Quotient Rules 1
Work in your Calculus Notebook!

Use the BEST method to find the derivative.

1. $g(x)=\cos 2x$
2. $h(t)=\dfrac{4}{\sqrt{x-1}}$
3. $f(x)=(5x-1)^3$
4. $g(x)=\sin^3(\pi x)$
5. $f(x)=\dfrac{6}{\sqrt[3]{2x-1}}$
6. $g(x)=\sec(4x)$
7. $g(x)=\cos^2 2x$
8. $h(t)=\tan(2x)$
9. $f(x)=(3x^2-2)^4$
10. $g(x)=\dfrac{2}{4x-3}$

Find the derivative. Factor if necessary.

11. $f(x)=(2x-1)^2(3x-1)^4$
12. $f(x)=\sin(2x)\cos(2x)$
13. $g(x)=\sqrt{4x-3}(x-1)^3$
14. $f(x)=\dfrac{\sqrt{x}}{x^2+1}$

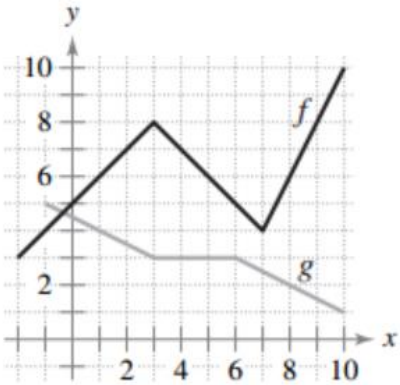
Find the equation of the tangent line at the given x-value.

15. $f(x)=\cos(3x)$; at $x=\dfrac{\pi}{6}$
16. $h(x)=\dfrac{1}{\sqrt{2x+1}}$; at $x=4$
17. $g(x)=\dfrac{3x-1}{2x+1}$; at $x=1$

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

18. $f(x)=(2x+1)^2(3x+4)^2$; $c=-1$
19. $f(x)=\sin(2x)$; $c=\dfrac{\pi}{8}$
20. Find the possible value(s) of k if $y=x^2-2kx$ has a tangent line of $y=2x-4$.

21. If $h(x)=f(g(x))$ and $s(x)=g(f(x))$, then use the graph to find each.
    a. $h'(1)$
    b. $s'(5)$



Answers

1. $-2\sin 2x$
2. $\dfrac{-2}{(x-1)^{3/2}}$
3. $15(5x-1)^2$
4. $3\pi\sin^2(\pi x)\cos(\pi x)$
5. $\dfrac{-4}{(2x-1)^{4/3}}$
6. $4\sec(4x)\tan(4x)$
7. $-4\cos(2x)\sin(2x)$
8. $2\sec^2(2x)$
9. $24x(3x^2-2)^3$
10. $\dfrac{-8}{(4x-1)^2}$
11. $4(2x-1)(3x-1)^3(9x-4)$
12. $2(\cos^2 2x-\sin^2 2x)$
13. $\dfrac{(x-1)^2(14x-11)}{\sqrt{4x-3}}$
14. $\dfrac{1-3x^2}{2\sqrt{x}(x^2+1)^2}$
15. $y-0=-3\left(x-\dfrac{\pi}{6}\right)$
16. $y-\dfrac{1}{3}=\dfrac{-1}{2}(x-4)$
17. $y-\dfrac{2}{3}=\dfrac{5}{9}(x-1)$
18. **-2**
19. $\sqrt{2}$
20. $k=1,-3$
21. **-**
    a. **½**
    b. **Not defined!**