4 Derivatives - The Power Rule
Work in your Calculus Notebook!

Find the derivative of each.

1. $y=8$
2. $y=x^8$
3. $f(x)=\sqrt[5]{x}$
4. $g(x)=3x-1$
5. $g(x)=x^2+4x^3$
6. $f(x)=2x^3-x^2+3x$
7. $y=x^2-\frac{1}{2}\cos x$
8. $y=\frac{5}{(2x)^3}+2\cos x$
9. $y=\frac{3}{(2x)^3}$
10. $y=\frac{4}{x^{-3}}$

Find the slope of each at the given point. Use your calculator to confirm your results.

11. $f(x)=\frac{1}{2}+\frac{7}{5}x^3;\ (0,-\frac{1}{2})$
12. $f(x)=3(5-x)^2;\ (5,0)$

Find the derivative of each function.

13. $f(x)=x^2+5-3x^{-2}$
14. $f(x)=x+\frac{1}{x^2}$
15. $y=x(x^2+1)$
16. $f(x)=\sqrt{x}-6\sqrt[3]{x}$
17. $f(x)=\sqrt[3]{x}+\sqrt[5]{x}$
18. $h(s)=s^{4/5}-s^{2/3}$
19. $f(t)=t^{2/3}-t^{1/3}+4$
20. $f(x)=6\sqrt{x}+6\cos x$
21. $f(x)=\frac{3}{\sqrt[3]{x}}+3\cos x$

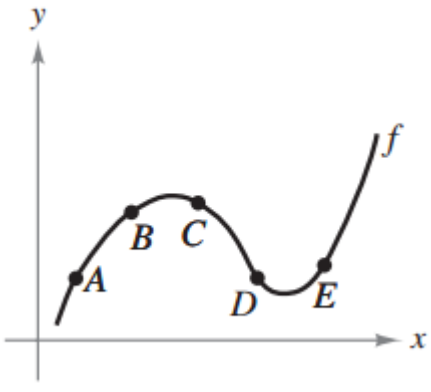
Find the point(s) (if any) where the graph of the function has a horizontal tangent line.

22. $y=x^4-8x^2+2$
23. $y=x^3+x$
24. $y=x+\sin x,\ 0\le x<2\pi$

25-26 Find k such that the line is tangent to the function.

25. Function: $f(x)=x^2-kx$, Line: $y=4x-9$
26. Function: $f(x)=k-x^2$, Line: $y=-4x+7$

$\frac{f(b)-f(a)}{b-a}$ is known as the AVERAGE RATE OF CHANGE between a and b. Use the figure to answer each.



27. Between which 2 consecutive points is the average rate of changes the greatest?
28. Is the average rate of change between A and B greater than or less than the instantaneous rate of change at B?
29. Sketch a tangent line to the graph between C and D such that the slope of the tangent line is the same as the average rate of change between C and D.

Answers

1. $y'=0$
2. $y'=8x^7$
3. $y'=\dfrac{1}{5x^{4/5}}$
4. $g'(x)=3$
5. $g'(x)=2x+12x^2$
6. $f'(x)=6x^2-2x+3$
7. $y'=2x+\frac{1}{2}\sin x$
8. $y'=\dfrac{-15}{8x^4}-2\sin x$
9. $y'=\dfrac{-9}{8x^4}$
10. $y'=12x^2$
11. $f'(0)=0$
12. $f'(5)=0$
13. $f'(x)=2x+\dfrac{6}{x^3}$
14. $f'(x)=1-\dfrac{2}{x^3}$
15. $y'=3x^2+1$
16. $f'(x)=\dfrac{1}{2\sqrt{x}}-\dfrac{2}{x^{2/3}}$
17. $f'(x)=\dfrac{1}{3x^{2/3}}+\dfrac{1}{5x^{4/5}}$
18. $h'(s)=\dfrac{4}{5s^{1/5}}-\dfrac{2}{3s^{1/3}}$
19. $f'(t)=\dfrac{2}{3t^{1/3}}-\dfrac{1}{3t^{2/3}}$
20. $f'(x)=\dfrac{3}{\sqrt{x}}-6\sin x$
21. $f'(x)=\dfrac{-1}{3x^{4/3}}-3\sin x$
22. Horizontal tangents at points: $(0,2)(2,-14)(-2,-14)$
23. No horizontal tangents!
24. Horizontal tangents at points: (π,π)
25. k = 2 or k = -10
26. k = 3
27. between A and B
28. the average rate of change is bigger.
29. -