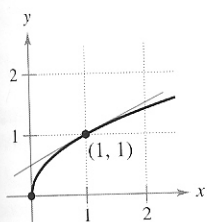


Exercises for Section 2.2

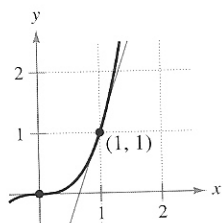
See www.CalcChat.com for worked-out solutions to odd-numbered exercises.

In Exercises 1 and 2, use the graph to estimate the slope of the tangent line to $y = x^n$ at the point (1, 1). Verify your answer analytically. To print an enlarged copy of the graph, go to the website www.mathgraphs.com.

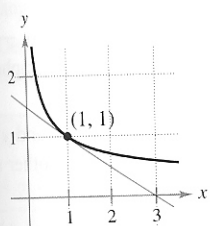
1. (a) $y = x^{1/2}$



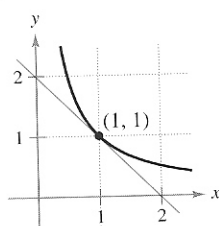
(b) $y = x^3$



2. (a) $y = x^{-1/2}$



(b) $y = x^{-1}$



In Exercises 3–24, find the derivative of the function.

3. $y = 8$

4. $f(x) = -2$

5. $y = x^6$

6. $y = x^8$

7. $y = \frac{1}{x^7}$

8. $y = \frac{1}{x^8}$

9. $f(x) = \sqrt[5]{x}$

10. $g(x) = \sqrt[4]{x}$

11. $f(x) = x + 1$

12. $g(x) = 3x - 1$

13. $f(t) = -2t^2 + 3t - 6$

14. $y = t^2 + 2t - 3$

15. $g(x) = x^2 + 4x^3$

16. $y = 8 - x^3$

17. $s(t) = t^3 - 2t + 4$

✓18. $f(x) = 2x^3 - x^2 + 3x$

19. $y = \frac{\pi}{2} \sin \theta - \cos \theta$

20. $g(t) = \pi \cos t$

21. $y = x^2 - \frac{1}{2} \cos x$

22. $y = 5 + \sin x$

23. $y = \frac{1}{x} - 3 \sin x$

24. $y = \frac{5}{(2x)^3} + 2 \cos x$

In Exercises 25–30, complete the table.

Original Function	Rewrite	Differentiate	Simplify
25. $y = \frac{5}{2x^2}$			
26. $y = \frac{2}{3x^2}$			
27. $y = \frac{3}{(2x)^3}$			
28. $y = \frac{\pi}{(3x)^2}$			

Original Function *Rewrite* *Differentiate* *Simplify*

29. $y = \frac{\sqrt{x}}{x}$

30. $y = \frac{4}{x^{-3}}$

In Exercises 31–38, find the slope of the graph of the function at the given point. Use the derivative feature of a graphing utility to confirm your results.

Function	Point
31. $f(x) = \frac{3}{x^2}$	(1, 3)
32. $f(t) = 3 - \frac{3}{5t}$	($\frac{3}{5}$, 2)
33. $f(x) = -\frac{1}{2} + \frac{7}{5}x^3$	(0, $-\frac{1}{2}$)
34. $y = 3x^3 - 6$	(2, 18)
35. $y = (2x + 1)^2$	(0, 1)
✓36. $f(x) = 3(5 - x)^2$	(5, 0)
37. $f(\theta) = 4 \sin \theta - \theta$	(0, 0)
✓38. $g(t) = 2 + 3 \cos t$	(π , -1)

In Exercises 39–52, find the derivative of the function.

39. $f(x) = x^2 + 5 - 3x^{-2}$ 40. $f(x) = x^2 - 3x - 3x^{-2}$
 41. $g(t) = t^2 - \frac{4}{t^3}$ ✓42. $f(x) = x + \frac{1}{x^2}$
 43. $f(x) = \frac{x^3 - 3x^2 + 4}{x^2}$ ✓44. $h(x) = \frac{2x^2 - 3x + 1}{x}$
 45. $y = x(x^2 + 1)$ 46. $y = 3x(6x - 5x^2)$
 47. $f(x) = \sqrt{x} - 6\sqrt[3]{x}$ ✓48. $f(x) = \sqrt[3]{x} + \sqrt[5]{x}$
 49. $h(s) = s^{4/5} - s^{2/3}$ ✓50. $f(t) = t^{2/3} - t^{1/3} + 4$
 51. $f(x) = 6\sqrt{x} + 5 \cos x$ 52. $f(x) = \frac{2}{\sqrt[3]{x}} + 3 \cos x$

✎ In Exercises 53–56, (a) find an equation of the tangent line to the graph of f at the given point, (b) use a graphing utility to graph the function and its tangent line at the point, and (c) use the derivative feature of a graphing utility to confirm your results.

Function	Point
53. $y = x^4 - 3x^2 + 2$	(1, 0)
54. $y = x^3 + x$	(-1, -2)
55. $f(x) = \frac{2}{\sqrt[4]{x^3}}$	(1, 2)
✓56. $y = (x^2 + 2x)(x + 1)$	(1, 6)

18, 36, 38, 42, 44, 48, 50, 56 (8)