> Use the rules for differentiating polynomials, exponentials and logarithms to find the derivative of each of the following functions. Remember your exponent and logarithmic laws, these will help you.

For any constant c and any $n \neq 0$,

Constant Rule	$\frac{d}{dx}(c) = 0$	Power Rule	$\frac{d}{dx}(x^n) = nx^{n-1}$

For any $a > 0$,

Exponential Rule	$\frac{d}{dx}(a^x) = \ln(a)a^x$	Logarithm Rule	$\frac{d}{dx}(\ln(x)) = \frac{1}{x}$

1. $y = 3x$

2. $y = 5$

3. $y = x^{-12}$

4. $y = x^{12}$

5. $y = 8t^3$

6. $y = x^{4/3}$

7. $y = 5x + 13$

8. $y = 3t^4 - 2t^2$

9. $f(q) = q^3 + 10$

10. $f(x) = \frac{1}{x^4}$

11. $y = 6x^3 + 4x^2 - 2x$

12. $y = x^2 + 5x + 9$

13. $y = 8t^3 - 4t^2 + 12t - 3$

14. $y = 3x^2 + 7x - 9$

15. $y = -3x^4 - 4x^3 - 6x$

16. $y = 4.2q^2 - 0.5q + 11.27$

17. $f(z) = \frac{1}{z^{6.1}}$

18. $g(t) = \frac{1}{t^5}$

19. $y = \sqrt{x}$

20. $y = \frac{1}{r^{7/2}}$

21. $f(x) = \sqrt{\frac{1}{x^3}}$

22. $h(t) = \frac{1}{\sqrt[3]{t}}$

23. $z = (t-1)(t+1)$

24. $R = (s^2 + 1)^2$

25. $y = z^2 + \frac{1}{2z}$

26. $y = 3t^2 - 5\sqrt{t} + \frac{7}{t}$

27. $h(t) = \frac{3}{t} + \frac{4}{t^2}$

28. $h(t) = t(t^{-1/2} - t^{-2})$

29. $y = \sqrt{x}(x+1)$

30. $z = \sqrt[4]{x^3} + 7\frac{1}{x^{-1}}$

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31. $P = 3t^3 + 2e^t$

32. $f(x) = 2e^x + x^2$

33. $f(x) = x^3 + 3^x$

34. $y = 5t^2 + 4e^t$

35. $P(t) = 5 \cdot 5^t + 6 \cdot 6^t$

36. $y = 2^x + \frac{2}{x^3}$

37. $y = 4 \cdot 10^x - x^3$

38. $f(x) = 2^x + 2 \cdot 3^x$

39. $y = 5 \cdot 2^x - 5x + 4$

40. $y = 3x - 2 \cdot 4^x$

41. $S = e^{0.7t}$

42. $f(t) = e^{3t}$

43. $P = e^{-0.2t}$

44. $y = e^{-4t}$

45. $P = 200e^{0.12t}$

46. $P(t) = 12.41(0.94)^t$

47. $P(t) = 3000(1.02)^t$

48. $y = 10^x + \frac{10}{x}$

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49. $f(x) = \ln(x)$

50. $h(t) = 2^t$

51. $D = 10 - \ln(p)$

52. $g(t) = 4\ln(t)$

53. $R = 3\ln(q)$

54. $R(q) = q^2 - 2\ln(q)$

55. $y = t^2 + 5\ln(t)$

56. $y = x^2 + 4x - 3\ln(x)$

57. $S(x) = 8^x - \ln(x)$

58. $F = \ln(x) + 16^x$

59. $y = 4e^x - 4^x$

60. $g(x) = \ln(3x)$

61. $y = \ln(5x)$

62. $f = \ln(7x)$

63. $R = \ln(5x) + x^2 - e^x$

Answers

1. $y' = 3$

2. $y' = 0$

3. $y' = -12x^{-13}$

4. $y' = 12x^{11}$

5. $y' = 24t^2$

6. $y' = \frac{4}{3}x^{1/3}$

7. $y' = 5$

8. $y' = 12t^3 - 4t$

9. $f'(q) = 3q + 10$

10. $f'(x) = -4x^{-5}$

11. $y' = 18x^2 + 8x - 2$

12. $y' = 2x + 5x + 9$

13. $y' = 24t^2 - 8t + 12$

14. $y' = 6x + 7$

15. $y' = -12x^3 - 12x^2 - 6$

16. $y' = 8.4q^2 - 0.5$

17. $f'(z) = -6.1z^{-7.1}$

18. $g'(t) = -5t^{-6}$

19. $y = \frac{1}{2}x^{-1/2}$

20. $y' = \frac{7}{2}r^{-9/2}$

21. $f'(x) = -\frac{3}{2}x^{-5/2}$

22. $h'(t) = -\frac{1}{3}t^{-4/3}$

23. $z' = 2t$

24. $R' = 4s^3 + 4s$

25. $y' = 2z + -\frac{1}{2}z^{-2}$

26. $y' = 6t - \frac{5}{2}t^{-1/2} - 7t^{-2}$

27. $h'(t) = -3t^{-2} - 8t^{-3}$

28. $h'(t) = \frac{1}{2}t^{-1/2} + t^{-2}$

29. $y' = \frac{3}{2}x^{1/2} + \frac{1}{2}x^{-1/2}$

30. $z' = \frac{3}{4}x^{-1/4} + 7$

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31. $P' = 9t^2 + 2e^t$

32. $f'(x) = 2e^x + 2x$

33. $f'(x) = 3x^2 + \ln(3)3^x$

34. $y' = 10t + 4e^t$

35. $P'(t) = 5\ln(5) \cdot 5^t + 6\ln(6) \cdot 6^t$

36. $y' = \ln(2)2^x - 6x^{-4}$

37. $y' = 4\ln(10) \cdot 10^x - 3x^2$

38. $f'(x) = \ln(2)2^x + 2\ln(3) \cdot 3^x$

39. $y' = 5\ln(2) \cdot 2^x - 5$

40. $y' = 3 - 2\ln(4) \cdot 4^x$

41. $S' = 0.7e^{0.7t}$

42. $f'(t) = 3e^{3t}$

43. $P' = -0.2e^{0.2t}$

44. $y' = -4e^{-4t}$

45. $P' = 24e^{0.12t}$

46. $P'(t) = 12.41\ln(0.94)(0.94)^t$

47. $P'(t) = 3000\ln(1.02)(1.02)^t$

48. $y' = \ln(10)10^x - 10x^{-2}$

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49. $f'(x) = \frac{1}{x}$

50. $h'(t) = \ln(2)2^t$

51. $D' = -\frac{1}{p}$

52. $g'(t) = 4\frac{1}{t}$

53. $R' = 3\frac{1}{q}$

54. $R'(q) = 2q - 2\frac{1}{q}$

55. $y' = 2t + 5\frac{1}{t}$

56. $y = 2x + 4 - 3\frac{1}{x}$

57. $S'(x) = \ln(8)8^x - \frac{1}{x}$

58. $F' = \frac{1}{x} + \ln(16)16^x$

59. $y' = 4e^x - \ln(4)4^x$

60. $g'(x) = \frac{1}{x}$

61. $y' = \frac{1}{x}$

62. $f' = \frac{1}{x}$

63. $R' = \frac{1}{x} + 2x - e^x$

These ones should have been on the Derivatives II sheet, sorry!

The End.