

82 DERIVADAS (con SOLUCIONES)

■ Hallar las derivadas simplificadas de las siguientes funciones:

1. $y = 5$	$(y'=0)$	20. $y = \frac{1}{x^3} + \frac{1}{x^2} + \frac{1}{x} + 1$	$\left(y' = -\frac{3}{x^4} - \frac{2}{x^3} - \frac{1}{x^2} \right)$
2. $y = 3/2$	$(y'=0)$	21. $y = \frac{1}{x^2 + 2x - 3}$	$\left(y' = -\frac{2x + 2}{(x^2 + 2x - 3)^2} \right)$
3. $y = 3x$	$(y'=3)$	22. $y = \frac{3}{x^3 - 2x^2 + 5}$	$\left(y' = -3 \frac{3x^2 - 4x}{(x^3 - 2x^2 + 5)^2} \right)$
4. $y = 2x - 3$	$(y'=2)$	23. $y = \frac{x^3 - 2x^2 + 5}{3}$	$\left(y' = \frac{3x^2 - 4x}{3} \right)$
5. $y = -x$	$(y'=-1)$	24. $y = \sqrt{x}$	$\left(y' = \frac{1}{2\sqrt{x}} \right)$
6. $y = \frac{x}{2} - 5$	$(y'=1/2)$	25. $y = \sqrt{6x}$	$\left(y' = \frac{3}{\sqrt{6x}} \right)$
7. $y = x^4$	$(y'=4x^3)$	26. $y = \sqrt{x^2 + x + 1}$	$\left(y' = \frac{2x + 1}{2\sqrt{x^2 + x + 1}} \right)$
8. $y = 2x^5$	$(y'=10x^4)$	27. $y = \sqrt[3]{x}$	$\left(y' = \frac{1}{3\sqrt[3]{x^2}} \right)$
9. $y = \frac{x^3}{2}$	$\left(y' = \frac{3x^2}{2} \right)$	28. $y = \sqrt[3]{x^2}$	$\left(y' = \frac{2}{3\sqrt[3]{x}} \right)$
10. $y = x^3 + x^2 + x + 1$	$(y'=3x^2 + 2x + 1)$	29. $y = 2\sqrt[3]{x^4} - 3\sqrt{x+1}$	$\left(y' = \frac{8}{3}\sqrt[3]{x} - \frac{3}{2\sqrt{x+1}} \right)$
11. $y = 2x^4 - 3x^2 + 5x - 8$	$(y'=8x^3 - 6x + 5)$	30. $y = (x^2 + 1)^2$	$(y'=4x^3 + 4x)$
12. $y = \frac{x^5}{5} - \frac{x^3}{3} + \frac{x^2}{4} - \frac{x}{7} + 5$	$\left(y' = x^4 - x^2 - \frac{x}{2} - \frac{1}{7} \right)$	31. $y = (x^2 + 1)^{100}$	$(y'=200x(x^2 + 1)^{99})$
13. $y = -x^4 + \frac{1}{7}$	$(y'=-4x^3)$	32. $y = (2x^3 - 3x + 5)^3$	$(y'=3(2x^3 - 3x + 5)^2(6x^2 - 3))$
14. $y = \frac{1}{x}$	$\left(y' = -\frac{1}{x^2} \right)$	33. $y = 5(\sqrt{x} + 1)^2$	$\left(y' = \frac{5(\sqrt{x} + 1)}{\sqrt{x}} \right)$
15. $y = \frac{3}{x}$	$\left(y' = -\frac{3}{x^2} \right)$	34. $y = \left(x^2 + \frac{1}{x} \right)^5$	$\left(y' = 5 \left(x^2 + \frac{1}{x} \right)^4 \left(2x - \frac{1}{x^2} \right) \right)$
16. $y = \frac{1}{3x}$	$\left(y' = -\frac{1}{3x^2} \right)$	35. $y = (2x^2 - 3)(x^2 - 3x + 1)$	$(y'=8x^3 - 18x^2 - 2x + 9)$
17. $y = \frac{1}{x^2}$	$\left(y' = -\frac{2}{x^3} \right)$		
18. $y = \frac{3}{x^3}$	$\left(y' = -\frac{9}{x^4} \right)$		
19. $y = \frac{1}{2x^4}$	$\left(y' = -\frac{2}{x^5} \right)$		

36. $y = (x^2+x+1)(x^2-x+1)$	$(y'=4x^3+2x)$	53. $y = \frac{1}{x\sqrt{x}}$	$\left(y' = -\frac{3\sqrt{x}}{2x^3} \right)$
37. $y = (x^2-3)(2x^2-5)^3$		54. $y = x^3 \sqrt{x}$	$\left(y' = \frac{7\sqrt{x^5}}{2} \right)$
38. $y = (x^2+1)(x-3)(x^2+x)$	$(y'=5x^4-8x^3-6x^2-4x-3)$	55. $y = \frac{1}{(x^2+x+1)^2}$	$\left(y' = -\frac{4x}{(x^2+x+1)^3} \right)$
39. $y = x^2 \sqrt{x}$	$\left(y' = \frac{5}{2} x \sqrt{x} \right)$	56. $y = \frac{x}{x^2+1}$	$\left(y' = -\frac{x^2+1}{(x^2+1)^2} \right)$
40. $y = \sqrt[4]{x^3} (2x-3)$	$\left(y' = \frac{14x-9}{4\sqrt[4]{x}} \right)$	57. $y = \frac{x^2-1}{x^2+1}$	$\left(y' = \frac{4x}{(x^2+1)^2} \right)$
41. $y = \frac{2x-3}{2x+3}$	$\left(y' = \frac{12}{(2x+3)^2} \right)$	58. $y = \sqrt{\frac{x^2+1}{x+1}}$	$\left(y' = \frac{(x^2+2x-1)\sqrt{x+1}}{2(x+1)^2\sqrt{x^2+1}} \right)$
42. $y = \frac{x^2-3}{2x+1}$	$\left(y' = \frac{2x^2+2x+6}{(2x+1)^2} \right)$	59. $y = \sqrt{\frac{x+1}{x-1}}$	$\left(y' = -\frac{\sqrt{x-1}}{(x-1)^2\sqrt{x+1}} \right)$
43. $y = \frac{2x^2-1}{x^2+2}$	$\left(y' = \frac{10x}{(x^2+2)^2} \right)$	60. $y = \sqrt{x^5}$	$\left(y' = \frac{5\sqrt{x^3}}{2} \right)$
44. $y = \frac{3}{x^2-1}$	$\left(y' = \frac{-6x}{(x^2-1)^2} \right)$	61. $y = \frac{\sqrt{x+2}}{x^2}$	$\left(y' = -\frac{3x+8}{2x^3\sqrt{x+2}} \right)$
45. $y = \frac{x}{\sqrt{x}}$	$\left(y' = \frac{1}{2\sqrt{x}} \right)$	62. $y = \frac{2x+3}{x^2+4x-1}$	$\left(y' = -\frac{2x^2+6x+14}{(x^2+4x-1)^2} \right)$
46. $y = \sqrt{\frac{1}{x}} + 1$	$\left(y' = \frac{-1}{2x\sqrt{x^2+x}} \right)$	63. $y = \frac{3x}{x^2-4}$	$\left(y' = -\frac{3x^2+12}{(x^2-4)^2} \right)$
47. $y = 3 \frac{x^2-4}{x^2+1}$	$\left(y' = \frac{30x}{(x^2+1)^2} \right)$	64. $y = \frac{x}{x-1}$	$\left(y' = -\frac{1}{(x-1)^2} \right)$
48. $y = \frac{(3x^2-1)^3}{x^2+1}$	$\left(y' = \frac{108x^7+108x^5-108x^3+20x}{(x^2+1)^2} \right)$	65. $y = \sqrt{x^2-5}$	$\left(y' = \frac{x}{\sqrt{x^2-5}} \right)$
49. $y = \sqrt[4]{x^3}$	$\left(y' = \frac{3}{4\sqrt[4]{x}} \right)$	66. $y = x^6-10x^4+8x-3$	$(y' = 6x^5-40x^3+8)$
50. $y = \frac{1}{\sqrt{x}}$	$\left(y' = -\frac{\sqrt{x}}{2x^2} \right)$	67. $y = \frac{x^3-x+1}{x-3}$	$\left(y' = \frac{2x^3-9x^2+2}{(x-3)^2} \right)$
51. $y = \frac{1}{\sqrt[3]{x}}$	$\left(y' = \frac{-1}{3\sqrt[3]{x^4}} \right)$	68. $y = \frac{x^2}{x^2-25}$	$\left(y' = -\frac{50x}{(x^2-25)^2} \right)$
52. $y = \frac{x}{\sqrt[3]{x}}$	$\left(y' = \frac{-2}{3\sqrt[3]{x}} \right)$	69. $y = 5x^4+x^3-x+6$	$(y' = 20x^3+3x^2-1)$

70. $y = \sqrt[3]{2x^7}$	$\left(y' = \frac{7 \sqrt[3]{2x^7}}{3x} \right)$	76. $y = 4x + \sqrt[5]{x}$	$\left(y' = 4 + \frac{1}{5 \sqrt[5]{x^4}} \right)$
71. $y = \frac{5}{x} + \sqrt{x^3}$	$\left(y' = \frac{-5}{x^2} + \frac{3}{2} \sqrt{x} \right)$	77. $y = 5x + \frac{2}{x}$	$\left(y' = 5 - \frac{2}{x^2} \right)$
72. $y = \frac{x^2 + x - 2}{x + 1}$	$\left(y' = \frac{x^2 + 2x + 3}{(x + 1)^2} \right)$	78. $y = 5x^9 (3x + 2)^3$	$(y' = 45x^8 (3x + 2)^2 (4x + 2))$
73. $y = x^4 - 10x^2 + 8$	$(y' = 4x^3 - 20x)$	79. $y = \frac{x\sqrt{x}}{x + 2}$	$\left(y' = \frac{\sqrt{x}(x + 6)}{2(x + 2)^2} \right)$
74. $y = \sqrt[6]{x}$	$\left(y' = \frac{1}{6 \sqrt[6]{x^5}} \right)$	80. $y = \frac{2x}{5x + 8}$	$\left(y' = \frac{16}{(5x + 8)^2} \right)$
75. $y = \frac{5}{x^2} + \sqrt{x}$	$\left(y' = \frac{-10}{x^3} + \frac{1}{2\sqrt{x}} \right)$	81. $y = (x^3 + 8x)^{10}$	$(y' = 10 (x^3 + 8x)^9 (3x^2 + 8))$
		82. $y = \frac{3x - 1}{x^5 - 4x}$	$\left(y' = \frac{-12x^5 + 5x^4 - 4}{(x^5 - 4x)^2} \right)$

83. Deducir la fórmula de la derivada de $y = \sqrt[n]{x}$ e $y = \sqrt[n]{u}$

84. Deducir las derivadas de $y = \frac{u}{v \cdot w}$ e $y = \frac{u \cdot v}{w}$