



## DERIVADAS

$$1. y = 5x^6 - 3x^5 + 3x^3 - 2$$

$$3. y = 3x^{10} + 2\sqrt{x} + \frac{3}{x}$$

$$5. y = 4 \operatorname{sen} x - 3 \operatorname{cos} x$$

$$7. y = 4x^3 + 2x^3 - x^3 + 4$$

$$9. y = \cos(3x)$$

$$11. y = \operatorname{sen}(3x^2 - 2x)$$

$$13. y = \operatorname{sen}^3(2x^2)$$

$$15. y = 3 \operatorname{sen}^2(2x - 3)$$

$$17. y = \cos(\operatorname{sen} x)$$

$$19. y = \sqrt[3]{\cos^2 x}$$

$$21. y = \sqrt{x^2 - 3x}$$

$$23. y = (2\sqrt{x} - 3x)^3$$

$$25. y = \sqrt[3]{\operatorname{sen}(3x)}$$

$$27. y = (3x^2 - \sqrt{1-x^2})^3$$

$$29. y = \sqrt{\operatorname{sen}^3 x + (x-1)^3}$$

$$31. y = \frac{x}{5}$$

$$33. y = \frac{x^4 - 3x}{4}$$

$$35. y = \frac{(x^4 - 3x)^2}{3}$$

$$37. y = \frac{x^2}{x^2 - 1}$$

$$39. y = \sqrt{\frac{3}{x}}$$

$$41. y = \sqrt[3]{3x^2 - \operatorname{sen} x}$$

$$43. y = \ln(x^2 - 3x)$$

$$45. y = \log_2(3x^2)$$

$$47. y = 2^x$$

$$49. y = 3^{\operatorname{sen} x}$$

$$51. y = 3e^{x-3x}$$

$$53. y = 3 \operatorname{tg}^2 x$$

$$55. y = x^2 \cdot \ln x$$

$$57. y = x^4 \cdot e^{3x}$$

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

$$4. y = \sqrt{3} \cdot x^3 - \pi \cdot x + \sqrt{3}$$

$$6. y = 2\sqrt{x} + \frac{2}{x} + x^5$$

$$8. y = \frac{\pi}{2} \cdot \cos x - 3\sqrt{x}$$

$$10. y = \cos^2(x^3)$$

$$12. y = \cos(x^2)$$

$$14. y = \cos^4(3x^4)$$

$$16. y = \cos^3(3x^2)$$

$$18. y = \cos^2(\operatorname{sen}(3x))$$

$$20. y = \sqrt[3]{\cos^2(x^2)}$$

$$22. y = \sqrt[3]{(x^2 - 3x)^2}$$

$$24. y = \sqrt[3]{\operatorname{sen}^2 x}$$

$$26. y = \sqrt{3x - \operatorname{sen} x}$$

$$28. y = \operatorname{sen}(\sqrt{3x^2 - 5x})$$

$$30. y = \cos^3(x^2 - 3\sqrt{x})$$

$$32. y = \frac{5}{x}$$

$$34. y = \frac{x^3 - 3}{x}$$

$$36. y = \frac{(x-1)^3}{3x}$$

$$38. y = \frac{\sqrt{3x}}{x}$$

$$40. y = \frac{x}{\sqrt{3x}}$$

$$42. y = \ln(3x-1)$$

$$44. y = \ln\sqrt{x-2}$$

$$46. y = e^{x^2}$$

$$48. y = e^{x^2-2x}$$

$$50. y = \operatorname{tg}(x^3)$$

$$52. y = \sqrt{e^{\operatorname{cos} x}}$$

$$54. y = (x^2 - 1) \cdot (x - 1)$$

$$56. y = e^{x^2} \cdot \cos x$$

$$58. y = e^{x^4-3x^2} \cdot \operatorname{sen} x$$

59.  $y = \ln x^2 \cdot e^{\sin x}$

61.  $y = \left( \frac{x^2 - 3}{x^2 + 1} \right)^3$

63.  $y = (\cos^2 3x - \sin^3 x) \cdot e^{x^2}$

65.  $y = \frac{\ln x}{3^x}$

67.  $y = \ln \left( \frac{\sin x}{e^x} \right)$

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

71.  $y = \operatorname{arctg}(x^2)$

73.  $y = \ln(\sec x)$

75.  $y = \arcsen x \cdot e^{\cos x}$

77.  $y = \ln \left( \frac{\operatorname{tg} x}{e^{3x^2}} \right)$

79.  $y = \ln(\operatorname{arctg}(5x))$

81.  $y = 5 \operatorname{arctg}^2(\sin x)$

83.  $y = \frac{\arcsen(3x - 2)}{x^2}$

85.  $y = x^{\sin x}$

87.  $y = (\cos x)^{x^2 - x}$

89.  $y = \ln \left( \frac{x + 2}{x^2} \right)^3$

91.  $y = 10 \left( \frac{\sin x - e^x}{3x - \cos x} \right)$

93.  $y = \frac{x^{\cos x}}{(\ln x)^3}$

95.  $y = \sqrt[3]{\frac{\sin^2(e^x)}{\operatorname{arctg}(\cos x)}}$

97.  $y = \frac{\sqrt{\cos(e^x)} \cdot x}{\sqrt{e^{3x}}}$

99.  $y = \sqrt{\frac{\operatorname{arctg} e^x \cdot \cos x}{\ln(x^2 - x)}}$

60.  $y = \frac{1}{\ln \sqrt{x}}$

62.  $y = \ln x \cdot e^{x^2 - \sin x}$

64.  $y = \left( \frac{\ln x^2}{x^3 - 2} \right)^2$

66.  $y = \frac{e^x + \ln x}{x^2 - \sin x}$

68.  $y = \sqrt{\frac{\sin x}{x - 1}}$

70.  $y = (\sin(e^{3x}))^2 \cdot \cos x$

72.  $y = \arcsen x^3$

74.  $y = \operatorname{arctg}(\ln x)$

76.  $y = \operatorname{arctg}(e^{3x})$

78.  $y = \arcsen \left( \frac{x + 1}{e^x} \right)$

80.  $y = \operatorname{arctg} \sqrt{x^3}$

82.  $y = 3^{\operatorname{arctg}(x^2)}$

84.  $y = \frac{\sin x - \operatorname{tg} x}{\sqrt{4x - 3}}$

86.  $y = (\sin x)^{x^2}$

88.  $y = 4^{\operatorname{arctg}(\ln x)}$

90.  $y = \left( \frac{e^{3x}}{\sin x} \right)^{x^2}$

92.  $y = \cos \left( \frac{\operatorname{tg} \sqrt{x}}{\sin(\ln x)} \right)$

94.  $y = \cos^2(4e^x) \cdot \ln \left( \frac{\operatorname{tg} x}{3^{x^2}} \right)$

96.  $y = \sqrt{\frac{e^{\ln(\cos x)}}{5^{\cos x}}}$

98.  $y = (\operatorname{tg}(e^x) + x^2)^x$

100.  $y = \frac{\ln \sqrt{\cos x}}{\sin(e^{\cos x})}$

**SOLUCIONES**

Todas las soluciones se dan sin simplificar

1.  $y' = 30x^5 - 15x^4 + 9x^2$

3.  $y' = 30x^9 + \frac{1}{\sqrt{x}} - \frac{3}{x^2}$

5.  $y' = 4 \cos x + 3 \operatorname{sen} x$

7.  $y' = 15x^2$

9.  $y' = -3 \operatorname{sen}(3x)$

11.  $y' = \cos(3x^2 - 2x) \cdot (6x - 2)$

13.  $y' = 3 \operatorname{sen}^2(2x^2) \cdot \cos(2x^2) \cdot 4x$

15.  $y' = 6 \operatorname{sen}(2x - 3) \cdot \cos(2x - 3) \cdot 2$

17.  $y' = -\operatorname{sen}(\operatorname{sen}x) \cdot \operatorname{cos}x$

19.  $y' = \frac{-2 \operatorname{cos}x \cdot \operatorname{sen}x}{3 \sqrt[3]{\operatorname{cos}^4 x}}$

21.  $y' = \frac{2x - 3}{2 \sqrt{x^2 - 3x}}$

23.  $y' = 3 \left( 2\sqrt{x} - 3x \right)^2 \cdot \left( \frac{1}{\sqrt{x}} - 3 \right)$

25.  $y' = \frac{3 \operatorname{cos} 3x}{5 \sqrt[3]{\operatorname{sen}^4(3x)}}$

27.  $y' = 3 \left( 3x^2 - \sqrt{1-x^2} \right)^2 \cdot \left( 6x - \frac{-2x}{2\sqrt{1-x^2}} \right)$

29.  $y' = \frac{3 \operatorname{sen}^2 x \operatorname{cos}x + 3(x-1)^2}{2 \sqrt{\operatorname{sen}^3 x + (x-1)^3}}$  30.

$y' = -3 \operatorname{cos}^2(x^2 - 3\sqrt{x}) \cdot \operatorname{sen}(x^2 - 3\sqrt{x}) \cdot \left( 2x - \frac{3}{2\sqrt{x}} \right)$

31.  $y' = \frac{1}{5}$

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

35.  $y' = \frac{2(x^4 - 3x)^2 \cdot (4x^3 - 3)}{3}$

37.  $y' = \frac{2x(x^2 - 1) - x^2 \cdot 2x}{(x^2 - 1)^2}$

2.  $y' = -4x^5 - 6x^4 + 1$

4.  $y' = 3\sqrt{3} \cdot x^2 - \pi$

6.  $y' = \frac{1}{\sqrt{x}} - \frac{2}{x^2} + 5x^4$

8.  $y' = -\frac{\pi}{2} \operatorname{sen} x - \frac{3}{2\sqrt{x}}$

10.  $y' = -2 \operatorname{cos}(x^3) \cdot \operatorname{sen}(x^3) \cdot 3x^2$

12.  $y' = -\operatorname{sen}(x^2) \cdot 2x$

14.  $y' = 4 \operatorname{cos}^3(3x^4) \cdot (-\operatorname{sen}(3x^4)) \cdot 12x^3$

16.  $y' = 5 \operatorname{cos}^4(3x^2) \cdot (-\operatorname{sen}(3x^2)) \cdot 6x$

18.  $y' = 2 \operatorname{cos}(\operatorname{sen}3x) \cdot (-\operatorname{sen}(\operatorname{sen}3x)) \cdot \operatorname{cos}3x \cdot 3$

20.  $y' = \frac{-2 \operatorname{cos}(x^2) \cdot \operatorname{sen}(x^2) \cdot 2x}{3 \sqrt[3]{\operatorname{cos}^4(x^2)}}$

22.  $y' = \frac{2(x^2 - 3x)(2x - 3)}{3 \sqrt[3]{(x^2 - 3x)^4}}$

24.  $y' = \frac{2 \operatorname{sen}x \operatorname{cos}x}{3 \sqrt[3]{\operatorname{sen}^4 x}}$

26.  $y' = \frac{3 - \operatorname{cos}x}{2 \sqrt{3x - \operatorname{sen}x}}$

28.  $y' = \operatorname{cos}(\sqrt{3x^2 - 5x}) \cdot \frac{6x - 5}{2\sqrt{3x^2 - 5x}}$

32.  $y' = -\frac{5}{x^2}$

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

36.  $y' = \frac{3(x-1)^2 \cdot 3x - 3(x-1)^3}{(3x)^2}$

38.  $y' = \frac{\frac{3}{2\sqrt{3x}} \cdot x - \sqrt{3x}}{x^2}$

$$39. y' = \frac{1}{2\sqrt{\frac{3}{x}}} \cdot \frac{-3}{x^2}$$

$$41. y' = \frac{6x - \cos x}{3\sqrt{(3x^2 - \sin x)^2}}$$

$$43. y' = \frac{2x - 3}{x^2 - 3x}$$

$$45. y' = \frac{6x}{3x^2 \cdot \ln 2}$$

$$47. y' = 2^x \cdot \ln 2$$

$$49. y' = 3^{\sin x} \cdot \cos x \cdot \ln 3$$

$$51. y' = 3 e^{x^2-3x} \cdot (2x-3)$$

$$53. y' = \frac{6 \operatorname{tg} x}{\cos^2 x}$$

$$55. y' = 2x \cdot \ln x + \frac{x^2}{x}$$

$$57. y' = 4x^3 \cdot e^{3x} + x^4 e^{3x} \cdot 3$$

$$59. y' = \frac{2x}{x^2} \cdot e^{\sin x} + \ln x^2 e^{\sin x} \cos x$$

$$61. y' = 3 \left( \frac{x^2-3}{x^2+1} \right)^2 \cdot \frac{2x(x^2+1) - (x^2-3)2x}{(x^2+1)^2}$$

$$62. y' = \frac{1}{x} \cdot e^{x^2-\sin x} + \ln x \cdot e^{x^2-\sin x} (2x - \cos x)$$

$$63. y' = (2 \cos 3x (-\sin 3x) 3 - 3 \sin^2 x \cos x) \cdot e^{x^3} + (\cos^2 3x - \sin^3 x) e^{x^3} 3x^2$$

$$64. y' = 2 \left( \frac{\ln x^2}{x^3-2} \right) \cdot \frac{\frac{2x}{x^2} (x^3-2) - \ln x^2 3x^2}{(x^3-2)^2}$$

$$65. y' = \frac{\frac{1}{x} 3^x - \ln x 3^x \ln 3}{(3^x)^2}$$

$$66. y' = \frac{\left( e^x + \frac{1}{x} \right) (x^2 - \sin x) - (e^x + \ln x) (2x - \cos x)}{(x^2 - \sin x)^2}$$

$$67. y' = \frac{e^x \cos x e^x - e^x \sin x}{(\ln x)^2}$$

$$68. y' = \frac{1}{2\sqrt{\frac{\sin x}{x-1}}} \cdot \frac{\cos x (x-1) - \sin x}{(x-1)^2}$$

$$40. y' = \frac{\sqrt{3x} - x \frac{3}{2\sqrt{3x}}}{3x}$$

$$42. y' = \frac{3}{3x-1}$$

$$44. y' = \frac{1}{2\sqrt{x-2}} \cdot \frac{1}{\sqrt{x-2}}$$

$$46. y' = e^{x^2} \cdot 2x$$

$$48. y' = e^{x^2-2x} \cdot (2x-2)$$

$$50. y' = \frac{3x^2}{\cos^2(x^3)}$$

$$52. y' = \frac{-e^{\cos x} \sin x}{2\sqrt{e^{\cos x}}}$$

$$54. y = 2x(x-1) + (x^2-1)$$

$$56. y' = e^{x^2} 2x \cos x - e^{x^2} \sin x$$

$$58. y' = e^{x^3-3x^2} \cdot (4x^3-6x) \sin x + e^{x^3-3x^2} \cos x$$

$$60. y' = \frac{1}{\ln \sqrt{x}} \cdot \frac{-\frac{2\sqrt{x}}{\sqrt{x}}}{(\ln \sqrt{x})^2}$$

$$69. y' = \frac{(12x^3 - 4x + 3)(2x - 1) - (3x^4 - 2x^2 + 3x - 2) \cdot 2}{(2x - 1)^2}$$

$$70. y' = 2 \left( \operatorname{sen}(e^{3x}) \right) \cdot \cos(e^{3x}) \cdot e^{3x} \cdot 3 \cos x - \left( \operatorname{sen}(e^{3x}) \right)^2 \cdot \operatorname{sen} x$$

$$71. y' = \frac{2x}{1 + x^4}$$

$$72. y' = \frac{3x^2}{\sqrt{1 - x^6}}$$

$$73. y' = \frac{\operatorname{sen} x}{\cos^2 x} \cdot \sec x$$

$$74. y' = \frac{\frac{1}{x}}{1 + (\ln x)^2}$$

$$75. y' = \frac{e^{\cos x}}{\sqrt{1 - x^2}} - \operatorname{arcsen} x \cdot e^{\cos x} \operatorname{sen} x$$

$$76. y' = \frac{e^{3x} \cdot 3}{1 + (e^{3x})^2}$$

$$77. y' = \frac{e^{3x^2} \cdot \frac{e^{3x^2}}{\cos^2 x} - \operatorname{tg} x \cdot e^{3x^2} \cdot 6x}{\operatorname{tg} x \cdot (e^{3x^2})^2}$$

$$78. y' = \frac{e^x - (x+1)e^x}{(e^x)^2} \cdot \sqrt{1 - \left( \frac{x+1}{e^x} \right)^2}$$

$$79. y' = \frac{1}{\operatorname{arctg}(5x)} \cdot \frac{5}{1 + (5x)^2}$$

$$80. y' = \frac{3x^2}{2\sqrt{x^3}} \cdot \frac{1}{1 + x^3}$$

$$81. y' = 10 \operatorname{arctg}(\operatorname{sen} x) \cdot \frac{\cos x}{1 + \operatorname{sen}^2 x}$$

$$82. y' = 3^{\operatorname{arctg}(x^2)} \cdot \frac{2x}{1 + x^4} \ln 3$$

$$83. y' = \frac{\frac{3x^2}{\sqrt{1 - (3x - 2)^2}} - \operatorname{arcsen}(3x - 2) \cdot 2x}{x^4}$$

$$84. y' = \frac{\left( \cos x - \frac{1}{\cos^2 x} \right) \sqrt{4x - 3} - (\operatorname{sen} x - \operatorname{tg} x) \cdot \frac{4}{2\sqrt{4x - 3}}}{4x - 3}$$

$$85. y' = \left( \cos x \cdot \ln x + \frac{\operatorname{sen} x}{x} \right) \cdot x^{\operatorname{sen} x}$$

$$86. y' = \left( 2x \ln(\operatorname{sen} x) + \frac{x^2 \cos x}{\operatorname{sen} x} \right) (\operatorname{sen} x)^{x^2}$$

$$87. y' = \left( (3x^2 - 1) \ln \cos x - \frac{(x^3 - x) \operatorname{sen} x}{\cos x} \right) \cdot (\cos x)^{x^2 - x}$$

$$88. y' = 4^{\operatorname{arctg}(\ln x)} \cdot \frac{\frac{1}{x}}{1 + (\ln x)^2} \cdot \ln 4$$

$$89. y' = \frac{1}{\left( \frac{x+2}{x^2} \right)^3} \cdot 3 \left( \frac{x+2}{x^2} \right)^2 \cdot \frac{x^2 - 2x(x+2)}{x^4}$$

$$90. y' = \left( 2x \ln x \left( \frac{e^{3x}}{\operatorname{sen} x} \right) + x^2 \frac{\operatorname{sen} x}{e^{3x}} \frac{3e^{3x} \operatorname{sen} x - e^{3x} \operatorname{cos} x}{\operatorname{sen}^2 x} \right) \cdot \left( \frac{e^{3x}}{\operatorname{sen} x} \right)^2$$

$$91. y' = 10 \left( \frac{\operatorname{sen} x - e^x}{3x - \operatorname{cos} x} \right) \cdot \ln 10 \frac{(\operatorname{cos} x - e^x)(3x - \operatorname{cos} x) - (\operatorname{sen} x - e^x)(3 + \operatorname{sen} x)}{(3x - \operatorname{cos} x)^2}$$

$$92. y' = -\operatorname{sen} \left( \frac{\operatorname{tg} \sqrt{x}}{\operatorname{sen}(\ln x)} \right) \cdot \frac{1}{\operatorname{cos}^2 \sqrt{x}} \cdot \frac{1}{2\sqrt{x}} \cdot \frac{\operatorname{sen}(\ln x) - \operatorname{tg} \sqrt{x} \cdot \operatorname{cos}(\ln x)}{\operatorname{sen}^2(\ln x)} \cdot \frac{1}{x}$$

$$93. y' = \frac{\left( -\operatorname{sen} x \ln nx + \frac{\operatorname{cos} x}{x} \right) x^{\operatorname{cos} x} (\ln x)^3 - x^{\operatorname{cos} x} 3 (\ln x)^2 \frac{1}{x}}{(\ln x)^6}$$

94.

$$y' = 2 \operatorname{cos}(4e^x) \cdot (-\operatorname{sen}(4e^x)) \cdot 4e^x \cdot \ln \left( \frac{\operatorname{tg} x}{3^{x^2}} \right) + \operatorname{cos}^2(4e^x) \cdot \frac{3^{x^2}}{\operatorname{cos}^2 x} - \operatorname{tg} x \cdot 3^{x^2} \cdot 2x \cdot \ln 3 \cdot \frac{1}{(3^{x^2})^2}$$

$$95. y = \frac{1}{2 \sqrt{\frac{e^{\ln(\operatorname{cos} x)}}{5^{\operatorname{cos} x}}}} \cdot \frac{e^{\ln(\operatorname{cos} x)} \cdot \frac{-\operatorname{sen} x}{\operatorname{cos} x} \cdot 5^{\operatorname{cos} x} - e^{\ln(\operatorname{cos} x)} \cdot 5^{\operatorname{cos} x} (-\operatorname{sen} x) \ln 5}{(5^{\operatorname{cos} x})^2}$$

96.

$$y' = \frac{1}{3 \sqrt{\frac{\operatorname{sen}^2(e^x)}{\operatorname{arctg}(\operatorname{cos} x)}}} \cdot \frac{2 \operatorname{sen}(e^x) \cdot \operatorname{cos}(e^x) \cdot e^x \cdot \operatorname{arctg}(\operatorname{cos} x) - \operatorname{sen}^2(e^x) \cdot \frac{1}{1 + \operatorname{cos}^2 x} \cdot (-\operatorname{sen} x)}{\operatorname{arctg}^2(\operatorname{cos} x)}$$

$$97. y' = \frac{-\operatorname{sen}(e^x) e^x x + \operatorname{cos}(e^x)}{\sqrt{\operatorname{cos}(e^x) \cdot x}} \cdot \sqrt{e^{\operatorname{tg} x}} - \sqrt{\operatorname{cos}(e^x) \cdot x} \cdot \frac{1}{2 \sqrt{e^{\operatorname{tg} x}}} \cdot e^{\operatorname{tg} x} \cdot \frac{1}{\operatorname{cos}^2 x}$$

$$98. y' = \left( \ln(\operatorname{tg} e^x + x^2) + x \frac{\frac{e^x}{\operatorname{cos}^2(e^x)} + 2x}{\operatorname{tg} e^x + x^2} \right) \cdot (\operatorname{tg}(e^x) + x^2)^{e^{x^2}}$$

99.

$$y' = \frac{1}{2 \sqrt{\frac{\operatorname{arctg} e^x \cdot \operatorname{cos} x}{\ln(x^2 - x)}}} \cdot \frac{\left( \frac{e^x}{1 + (e^x)^2} \operatorname{cos} x - \operatorname{arctg} e^x \operatorname{sen} x \right) \ln(x^2 - x) - (\operatorname{arctg} e^x \operatorname{cos} x) \frac{2x - 1}{x^2 - x}}{\ln^2(x^2 - x)}$$

$$100. y' = \frac{\frac{1}{\sqrt{\cos x}} \frac{-\sin x}{2\sqrt{\cos x}} \sin(e^{\cos x}) - \ln \sqrt{\cos x} \cos(e^{\cos x}) e^{\cos x} (-\sin x)}{\sin^2(e^{\cos x})}$$