

Derivative Practice Worksheet (ANSWER KEY)

1. 0

2. 0

3. $2x$

4. $-4t + 3$

5. $3t^2 - 2$

6. $\cos x$

7. $\sec^2 x$

8. $-\csc^2 x$

9. $-\sin x$

10. $-\csc x \cot x$

11. $\sec x \tan x$

12. $2x + \frac{1}{2} \sin x$

13. $\cos x$

14. $\frac{-1}{x^2} - 3 \cos x$

15. $-\pi \sin t$

16. $\frac{-1}{x^4}$

17. $\frac{-1}{2} x^{\frac{-3}{2}}$

18. $3x^2 - 3 + 8x^{-5}$

19. $\frac{(2x-3)(3)-(3x-2)(2)}{(2x-3)^2}$

20. $\frac{(x^2-1)(-2-2x)-(3-2x-x^2)(2x)}{(x^2-1)^2}$

21. $(x^3-1)(2x-2)+(x^2-2x+1)(3x^2)$

22. $(\cos x)(1)+(x)(-\sin x)$

23. $\frac{(\sqrt{x})(1)-(x+1)(\frac{1}{2}x^{-\frac{1}{2}})}{(\sqrt{x})^2}$

24. $(\cos \theta)(1)+(\theta+1)(-\sin \theta)$

25. $1 - \csc^2 x$

26. $\frac{1}{2}t^{\frac{-1}{2}} + 4 \sec t \tan t$

27. $\csc x \cot x - \cos x$

28. $(\tan x)(2x)+(x^2)(\sec^2 x)$

29. $3(3x-2x^2)^2(3-4x)$

30. $(\sqrt{1-x^2})(2x)+(x^2)\left(\frac{1}{2}(1-x^2)^{-\frac{1}{2}}(-2x)\right)$

31. $\frac{(\sqrt[3]{y^2+4})(1)-(y)\left(\frac{1}{3}(y^2+4)^{-\frac{2}{3}}(2y)\right)}{(\sqrt[3]{y^2+4})^2}$

32. $2\left(\frac{3x-1}{x^2+3}\right)\left(\frac{(x^2+3)(3)-(3x-1)(2x)}{(x^2+3)^2}\right)$

33. $(-\sin(3x^2))(6x)$

34. $(\cos 3)(2x)$

35. $(-\sin((3x)^2))(2(3x))(3)$

36. $2(\cos(3x))(-\sin(3x))(3)$

37. $3(\sin(4t))^2(\cos(4t))(4)$

$$38. \frac{1}{3}(9x^2 + 4)^{\frac{-2}{3}}(18x)$$

$$39. \frac{-1}{(x-2)^2}$$

$$40. (\sqrt{3-2x})\left(4(3x^2+1)^3(6x)\right) \\ + (3x^2+1)^4\left(\frac{1}{2}(3-2x)^{\frac{-1}{2}}(-2)\right)$$

$$41. 3y^2 \frac{dy}{dx} = 1 \\ \frac{dy}{dx} = \frac{1}{3y^2}$$

$$42. (y^2)(1) + (x)\left(2y \frac{dy}{dx}\right) = 0 \\ 2xy \frac{dy}{dx} = -y^2 \\ \frac{dy}{dx} = \frac{-y^2}{2xy}$$

$$43. 3y^2 \frac{dy}{dx} + 2y \frac{dy}{dx} - 5 \frac{dy}{dx} - 2x = 0 \\ 3y^2 \frac{dy}{dx} + 2y \frac{dy}{dx} - 5 \frac{dy}{dx} = 2x \\ \frac{dy}{dx} = \frac{2x}{3y^2 + 2y - 5}$$

$$44. 2x + 8y \frac{dy}{dx} = 0 \\ 8y \frac{dy}{dx} = -2x \\ \frac{dy}{dx} = \frac{-2x}{8y}$$

$$45. 6(x^2 + y^2)\left(2x + 2y \frac{dy}{dx}\right) = 100\left((y)(1) + (x)\left(\frac{dy}{dx}\right)\right) \\ 12x(x^2 + y^2) + 12y(x^2 + y^2) \frac{dy}{dx} = 100y + 100x \frac{dy}{dx} \\ 12y(x^2 + y^2) \frac{dy}{dx} - 100x \frac{dy}{dx} = 100y - 12x(x^2 + y^2) \\ \frac{dy}{dx} = \frac{100y - 12x(x^2 + y^2)}{12y(x^2 + y^2) - 100x}$$

$$46. 3x^2 - \left((y)(1) + (x)\left(\frac{dy}{dx}\right)\right) + 2y \frac{dy}{dx} = 0 \\ 3x^2 - y - x \frac{dy}{dx} + 2y \frac{dy}{dx} = 0 \\ -x \frac{dy}{dx} + 2y \frac{dy}{dx} = -3x^2 + y \\ \frac{dy}{dx} = \frac{-3x^2 + y}{-x + 2y}$$

$$47. \frac{1}{2}(xy)^{\frac{-1}{2}}\left((y)(1) + (x)\left(\frac{dy}{dx}\right)\right) = 1 - 2 \frac{dy}{dx} \\ \frac{1}{2}y(xy)^{\frac{-1}{2}} + \frac{1}{2}x(xy)^{\frac{-1}{2}} \frac{dy}{dx} = 1 - 2 \frac{dy}{dx} \\ \frac{1}{2}x(xy)^{\frac{-1}{2}} \frac{dy}{dx} + 2 \frac{dy}{dx} = 1 - \frac{1}{2}y(xy)^{\frac{-1}{2}} \\ \frac{dy}{dx} = \frac{1 - \frac{1}{2}y(xy)^{\frac{-1}{2}}}{\frac{1}{2}x(xy)^{\frac{-1}{2}} + 2}$$

$$48. \cos x + 2\left(-\sin(2y)\left(2 \frac{dy}{dx}\right)\right) = 0 \\ \cos x - 4 \sin(2y) \frac{dy}{dx} = 0 \\ -4 \sin(2y) \frac{dy}{dx} = -\cos x \\ \frac{dy}{dx} = \frac{-\cos x}{-4 \sin(2y)}$$

$$49. \frac{2}{3}x^{\frac{-1}{3}} + \frac{2}{3}y^{\frac{-1}{3}} \frac{dy}{dx} = 0 \\ \frac{2}{3}y^{\frac{-1}{3}} \frac{dy}{dx} = -\frac{2}{3}x^{\frac{-1}{3}} \\ \frac{dy}{dx} = \frac{-\frac{2}{3}x^{\frac{-1}{3}}}{\frac{2}{3}y^{\frac{-1}{3}}}$$

$$50. (\sec^2(x+y))\left(1 + \frac{dy}{dx}\right) = 1 \\ \sec^2(x+y) + \sec^2(x+y) \frac{dy}{dx} = 1 \\ \sec^2(x+y) \frac{dy}{dx} = 1 - \sec^2(x+y) \\ \frac{dy}{dx} = \frac{1 - \sec^2(x+y)}{\sec^2(x+y)}$$