

Sample Derivative Mastery Test
(Answers reflect no simplifying)

Find y' for each function y below:

1. $y = \sin x$ $y' = \cos x$

2. $y = \cos x$ $y' = -\sin x$

3. $y = \tan x$ $y' = \sec^2 x$

4. $y = \sec x$ $y' = \sec x \tan x$

5. $y = \cot x$ $y' = -\csc^2 x$

6. $y = \csc x$ $y' = -\csc x \cot x$

7. $y = \arcsin x$ $y' = 1/\sqrt{1-x^2}$

8. $y = \arctan x$ $y' = 1/(1+x^2)$

9. $y = \operatorname{arcsec} x$ $y' = 1/(x \sqrt{x^2-1})$

10. $y = \log_7 x$ $y' = 1/(x \ln 7)$

11. $y = \ln x$ $y' = 1/x$

12. $y = e^x$ $y' = e^x$

13. $y = e^\pi$ $y' = 0$

14. $y = 7^x$ $y' = 7^x \ln 7$

15. $y = x^{23}$ $y' = 23x^{22}$

16. $y = 1/x$ $y' = -x^{-2}$

17. $y = x^5 + 5^x$ $y' = 5x^4 + 5^x \ln 5$

18. $y = \sqrt{x}$ $y' = (1/2)x^{-1/2}$

19. $y = x^{-3/4}$ $y' = (-3/4)x^{-7/4}$

20. $x^{\pi+1}$ $y' = (\pi + 1)x^\pi$

21. $y = x \sin(x)$ $y' = 1 \cdot \sin(x) + x \cdot \cos(x)$

22. $y = x/\sin(x)$ $y' = (1 \cdot \sin(x) - x \cdot \cos(x))/(\sin(x))^2$

$$23. y = \tan(x)/\ln(x) \quad y' = (\sec^2 x \cdot \ln x - \tan x \cdot 1/x) / (\ln(x))^2$$

$$24. y = \sqrt{\tan(x)} \quad y' = (1/2)(\tan(x))^{-1/2} \cdot \sec^2 x$$

$$25. y = e^{\sin(x)} \quad y' = e^{\sin(x)} \cos(x)$$

$$26. y = \ln(\sin(x)) \quad y' = 1/(\sin(x)) \cdot \cos(x)$$

$$27. y = \sin(\ln(x)) \quad y' = \cos(\ln(x)) \cdot 1/x$$

$$28. y = x^{\sin(x)} \quad \begin{aligned} \ln y &= \ln(x^{\sin(x)}) \\ \ln y &= \sin(x) \ln x \\ d/dx(\ln y) &= \sin(x) \ln x \\ 1/y \cdot y' &= \cos(x) \ln x + \sin(x) \cdot 1/x \\ y' &= (\cos(x) \ln x + \sin(x) \cdot 1/x) \cdot y \\ y' &= (\cos(x) \ln x + \sin(x) \cdot 1/x) \cdot x^{\sin(x)} \end{aligned}$$

$$32. y = (\tan x)^5 \quad y' = 5(\tan x)^4 (\sec^2 x)$$

$$33. y = \tan x^5 \quad y' = \sec^2(x^5) (5x^4)$$

$$34. y = \arctan(\tan(3)) \quad y' = 0$$

$$35. y = \arctan(\cos(x)) \quad y' = 1/(1 + (\cos(x))^2) \cdot (-\sin(x))$$

$$36. y = e^{(\sin(x))^3} \quad y' = e^{(\sin(x))^3} (3 \sin^2(x) \cos(x))$$

$$37. y = x e^x \sin(x) \quad y' = 1 \cdot e^x \sin(x) + x \cdot e^x \sin(x) + x \cdot e^x \cos(x)$$

$$38. y = x e^x / \sin(x) \quad y' = ((1 \cdot e^x + x \cdot e^x) \sin x - (x \cdot e^x) (\cos x)) / \sin^2 x$$

$$39. y^4 + xy = x^2 \quad \text{Solve for } y'. \quad \begin{aligned} 4y^3 y' + 1 \cdot y + x \cdot 1 \cdot y' &= 2x \\ y'(4y^3 + x \cdot 1) &= 2x - y \\ y' &= (2x - y) / (4y^3 + x \cdot 1) \end{aligned}$$

$$40. y = x^2/f(x) \quad \text{Find } y' \text{ in terms of } f \text{ and } f'. \\ y' = (2x \cdot f(x) - x^2 \cdot f'(x)) / (f(x))^2$$