

- Find the derivative of $y = x^2$ with respect to $\ln x$.
- Find the derivative of y^2 with respect to x^4 if $y = \sqrt{x^2 + 5}$
- Simplify $e^{4 \ln x}$
- Find $\frac{dy}{dx}$ if $y = 3^{x+1}$
- Find $\frac{dy}{dx}$ if $y = (\ln x)^x$
- Find $\frac{dy}{dx}$ if $y = \sqrt{4x^2 + 4x}$
- Find $\frac{dy}{dx}$ if $y = \cos x \sin x$
- Find $\frac{dy}{dx}$ if $y = \cos^3 5x$
- Find $\frac{dy}{dx}$ if $y = \ln(xe^{2x})$
- Which of the following functions does not have a derivative equal to $\frac{1}{x}$?
 - $\ln(ex)$
 - $\ln(2x)$
 - $\ln(e^{\ln x})$
 - $\ln(xe^x)$
- Write the equation of the tangent line to $f(x) = e^{2x}$ at $x = 2$.
- Find $\frac{dy}{dx}$ if $y = \ln(6x^2 - 3)$
- Simplify $e^{4x+2 \ln x}$
- Find $\frac{dy}{dx}$ if $y = \ln |\sin 3x|$
- Find $\frac{dy}{dx}$ if $y = 2^{\cos x}$
- Find $\frac{dy}{dx}$ if $y = \ln\left(\frac{x^2}{e^{6x}}\right)$
- Find $\frac{dy}{dx}$ if $y = x^2 \sec 4x$
- Find the derivative of $y = x^3 + 2x^2$ with respect to $\cos x$.
- Find $\frac{dy}{dx}$ if $y = x^{\cot 2x}$
- Find $\frac{dy}{dx}$ if $y = \cos^2(3x) + \sin^2(3x)$

Answers:

| | | |
|--|--|-----------------------------------|
| 1. $2x^2$ | 2. $\frac{1}{2x^2}$ | 3. x^4 |
| 4. $3^{x+1} \ln 3$ | 5. $(\ln x)^x \left[\frac{1}{\ln x} + \ln(\ln x) \right]$ | 6. $\frac{2x+1}{\sqrt{x^2+x}}$ |
| 7. $\cos 2x$ | 8. $-15 \cos^2 5x \sin 5x$ | 9. $\frac{1+2x}{x}$ |
| 10. D | 11. $y - e^4 = 2e^4(x - 2)$ | 12. $\frac{4x}{2x^2 - 1}$ |
| 13. $x^2 e^{4x}$ | 14. $3 \cot 3x$ | 15. $-2^{\cos x} (\ln 2)(\sin x)$ |
| 16. $\frac{2-6x}{x}$ | 17. $2x \sec 4x(1 + 2x \tan 4x)$ | 18. $\frac{-3x^2 - 4x}{\sin x}$ |
| 19. $\left(-2 \ln x \csc^2 2x + \frac{\cot 2x}{x}\right) x^{\cot x}$ | 20. 0 | |