

Derivative Rules

1. $\frac{d}{dx}[f(x)g(x)] = f'(x)g(x) + f(x)g'(x)$ Product Rule
2. $\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$ Quotient Rule
3. $\frac{d}{dx}[f(g(x))] = f'(g(x))g'(x)$ Chain Rule
4. $\frac{d}{dx}(e^x) = e^x$
5. $\frac{d}{dx}[e^{f(x)}] = e^{f(x)}f'(x)$ Special case of Chain rule
6. $\frac{d}{dx}(\ln x) = \frac{1}{x}$
7. $\frac{d}{dx}[\ln(f(x))] = \frac{f'(x)}{f(x)}$ Special case of Chain rule
8. $\frac{d}{dx}[a^x] = a^x \ln a$
9. $\frac{d}{dx}(\sin x) = \cos x$
10. $\frac{d}{dx}(\cos x) = -\sin x$
11. $\frac{d}{dx}(\tan x) = \sec^2 x$
12. $\frac{d}{dx}(\sec x) = \sec x \tan x$
13. $\frac{d}{dx}(\csc x) = -\csc x \cot x$
14. $\frac{d}{dx}(\cot x) = -\csc^2 x$
15. $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$
16. $\frac{d}{dx}(\cos^{-1} x) = \frac{-1}{\sqrt{1-x^2}}$
17. $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$
18. $\frac{d}{dx}(\sec^{-1} x) = \frac{1}{|x|\sqrt{x^2-1}}$
19. $\frac{d}{dx}(\csc^{-1} x) = \frac{-1}{|x|\sqrt{x^2-1}}$
20. $\frac{d}{dx}(\cot^{-1} x) = \frac{-1}{1+x^2}$