

## Differentiation

1.  $\frac{d}{dx}(a^x) = a^x \log_e a$
2.  $\frac{d}{dx}(\log_a x) = \frac{1}{x} \log_a e$
3.  $\frac{d}{dx}\left(\frac{1}{x}\right) = -\frac{1}{x^2}$
4.  $\frac{d}{dx}(e^x) = e^x \log_e e = e^x$
5.  $\frac{d}{dx}(\log x) = \frac{1}{x}$
6.  $\frac{d}{dx}(\sin x) = \cos x$
7.  $\frac{d}{dx}(\cos x) = -\sin x$
8.  $\frac{d}{dx}(\tan x) = \sec^2 x$
9.  $\frac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$
10.  $\frac{d}{dx}(\sec x) = \sec x \tan x$
11.  $\frac{d}{dx}(\operatorname{cosec} x) = -\operatorname{cosec} x \cot x$
12.  $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$
13.  $\frac{d}{dx}(\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}$
14.  $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$
15.  $\frac{d}{dx}(\cot^{-1} x) = \frac{-1}{1+x^2}$
16.  $\frac{d}{dx}(\sec^{-1} x) = \frac{1}{x\sqrt{-1+x^2}}$
17.  $\frac{d}{dx}(\operatorname{cosec}^{-1} x) = \frac{-1}{x\sqrt{-1+x^2}}$
18.  $\frac{d}{dx}(a.b) = a \cdot \frac{d}{dx}(b) + b \cdot \frac{d}{dx}(a)$
19.  $\frac{d}{dx}(a.b.c) = \frac{da}{dx} \cdot b.c + a \cdot \frac{db}{dx} \cdot c + a.b \cdot \frac{dc}{dx}$
20.  $\frac{d}{dx}\left(\frac{a}{b}\right) = \frac{b \cdot \frac{da}{dx} - a \cdot \frac{db}{dx}}{b^2}$