

# Simple Differentiation

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## 1 Some Fundamental Terms

(a).

$$\frac{d(u+v)}{dx} = \frac{d(u)}{dx} + \frac{d(v)}{dx}$$

(b).

$$\frac{d(u-v)}{dx} = \frac{d(u)}{dx} - \frac{d(v)}{dx}$$

(c).

$$\frac{d(ku)}{dx} = k \frac{d(u)}{dx}$$

(d).

$$\frac{d(u \times v)}{dx} = v \frac{d(u)}{dx} + u \frac{d(v)}{dx}$$

(e).

$$\frac{d\left(\frac{u}{v}\right)}{dx} = \frac{v \frac{d(u)}{dx} - u \frac{d(v)}{dx}}{v^2}$$

## 2 Some Basic Formula about Differentiation

(a).  $\frac{d(\sin x)}{dx} = \cos x$

(b).  $\frac{d(\cos x)}{dx} = -\sin x$

(c).  $\frac{d(\tan x)}{dx} = \sec^2 x$

(d).  $\frac{d(\cot x)}{dx} = -\operatorname{cosec}^2 x$

(e).  $\frac{d(\sec x)}{dx} = \sec x \cdot \tan x$

(f).  $\frac{d(\operatorname{cosec} x)}{dx} = -\cot x \cdot \operatorname{cosec} x$

(g).  $\frac{d(e^x)}{dx} = e^x$

(h).  $\frac{d(a^x)}{dx} = a^x \cdot \log_e a$

(i).  $\frac{d(\log_e x)}{dx} = \frac{1}{x}$

$$(j). \frac{d(\log_a x)}{dx} = \frac{1}{x} \cdot \log_a e$$

$$(k). \frac{d(x^n)}{dx} = nx^{n-1}$$

$$(l). \frac{d(x)}{dx} = 1$$

$$(m). \frac{d(\sqrt{x})}{dx} = \frac{1}{2\sqrt{x}}$$

$$(n). \frac{d(c)}{dx} = 0$$

### 3 Some Facts Related to $\infty$

$$(a). \infty + \text{any no} = \infty$$

$$(b). \infty - \text{any no} = \infty$$

$$(c). \infty \times \text{any non zero no} = \infty$$

$$(d). \frac{\infty}{\text{any no}} = \infty$$

$$(e). (\infty)^{+power} = \infty$$

$$(f). (\infty)^{-power} = 0$$

$$(g). \frac{\text{any no}}{\infty} = 0$$

$$(h). \frac{\text{any no}}{0} = \infty$$