symbol for the operation: *differentiation* with respect to x.

In terms of such a system of notations, we summarize the basic laws of differentation and integration as follows:

(i) $\frac{d}{dx}(f(x)+g(x)) = \frac{d}{dx}f(x) + \frac{d}{dx}g(x)$

or $d(f(x)+g(x)) = df(x) + dg(x)$.

(ii) $\frac{d}{dx}(c \cdot f(x)) = c\frac{d}{dx}f(x)$, $c =$ constant

or $d(c \cdot f(x)) = c \cdot df(x)$.

(iii) $\frac{d}{dx}(f(x) \cdot g(x)) = \frac{d}{dx}f(x) \cdot g(x) + f(x) \cdot \frac{d}{dx}g(x)$

or $d(f(x) \cdot g(x)) = df(x) \cdot g(x) + f(x) \cdot dg(x)$.

(iv) $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{\frac{d}{dx}f(x) \cdot g(x) - f(x)\frac{d}{dx}g(x)}{[g(x)]^2}$

or $d\left(\frac{f(x)}{g(x)}\right) = \frac{df(x) \cdot g(x) - f(x) \cdot dg(x)}{[g(x)]^2}$.

(v) $z = g(y)$, $y = f(x)$, i.e., $z = g(f(x))$, $dz = g'(y)dy$,

$dy = f'(x)dx$, $dz = g'(y) \cdot f'(x)dx$.

Thus the chain rule of differentiation, namely

$$\frac{dz}{dx} = \frac{dz}{dy} \cdot \frac{dy}{dx}$$

becomes formally obvious.