1 Basic Calculus

1.1 Differentiation

Rule - Differentiation of Powers

$$\begin{aligned} y &= x^n \\ \frac{dy}{dx} &= nx^{n-1} \end{aligned} \tag{1}$$

Example 1 $y = x^2$
$\frac{dy}{dx} = 2x^{2-1} = 2x$
Example 2 $y = x^2$
$\frac{dy}{dx} = 2x^{2-1} = 2x$
Example 3 $y = x$
$\frac{dy}{dx} = 1x^{1-1} = 1.1$
Example 4 $y = 3$
$\frac{dy}{dx} = 3.0 = 0$
Example 5 $y = 4x^3$
$\frac{dy}{dx} = 4 * 3 * x^{3-1} = 12x^2$
Example 6 $y = 3x + 3x^4 + 7$
$\frac{dy}{dx} = 3 * x^{1-1} + 3 * 4 * x^{4-1} + 7 * 0$
$\frac{dy}{dx} = 3 * x^0 + 12 * x^3 + 0$
$\frac{dy}{dx} = 3 + 12x^3$