

DIFFERENTIATION

$$y = x^n$$

$$\frac{dy}{dx} = \frac{d}{dx} x^n$$

$$\boxed{\frac{dy}{dx} = n x^{n-1}}$$

$$y = a x^n$$

$$\frac{dy}{dx} = \frac{d}{dx} (a x^n)$$

$$= a \frac{d}{dx} x^n$$

$$\frac{dy}{dx} = a n x^{n-1}$$

Ex $x^5 \rightarrow \frac{dy}{dx} = ?$

$$\frac{d}{dx} x^5 = 5 x^{5-1} = 5 x^4$$

Ex $0.6 x^7$

$$\frac{d}{dx} (0.6 x^7) = 0.6 \frac{d}{dx} x^7$$

$$= 0.6 \times 7 \times x^{7-1}$$

$$= 4.2 x^6$$

Exercise Find $\frac{dy}{dx}$ for

$$2 x^{1.5}$$

DIFFERENTIATION OF A SUM OF FUNCTIONS

THE DIFFERENTIATION OF A SUM OF FUNCTIONS IS EQUAL TO THE SUM OF THE INDIVIDUAL DIFFERENTIATIONS OF THE FUNCTIONS.

$$y = f_1(x) + f_2(x) + f_3(x)$$

$$\frac{dy}{dx} = \frac{d}{dx} f_1(x) + \frac{d}{dx} f_2(x) + \frac{d}{dx} f_3(x)$$

Ex $y = 5x^3 + 6x^2 + 7$

FIND $\frac{dy}{dx}$

$$\frac{dy}{dx} = \frac{d}{dx} 5x^3 + \frac{d}{dx} 6x^2 + \frac{d}{dx} 7$$

$$= 5 \frac{d}{dx} x^3 + 6 \frac{d}{dx} x^2 + 0$$

$$= 5 \times 3 x^{3-1} + 6 \times 2 x^{2-1}$$

$$= 15x^2 + 12x$$

Ex $y = \sin x + \cos x$

$$\frac{dy}{dx} = ?$$

$$\frac{dy}{dx} = \frac{d}{dx} \sin x + \frac{d}{dx} \cos x$$

$$= \cos x + (-\sin x)$$

$$= \cos x - \sin x$$

$$\frac{d}{dx} \sin x = \cos x$$

$$\frac{d}{dx} \cos x = -\sin x$$