Differentiation

1. $x^n \longrightarrow nx^{n-1}$ e.g. $x^3 \longrightarrow 3x^2$

2. $x \longrightarrow 1$ e.g. $3x \longrightarrow 3$

3. number $\longrightarrow 0$ e.g. $5 \longrightarrow 0$

4. $\frac{1}{x^n} \longrightarrow x^{-1}$ e.g. $\frac{3}{x^2} \longrightarrow 3x^{-2}$

example

differentiate $y = 4x^5 + 7x + 3$

$$\frac{dy}{dx} = 20x^4 + 7$$

differentiate $y = 7 + 6x + 3x^4 + 2 + \frac{4}{5x^3}$

$$\frac{dy}{dx} = 6 + 12x^3 + 20x^{-3}$$

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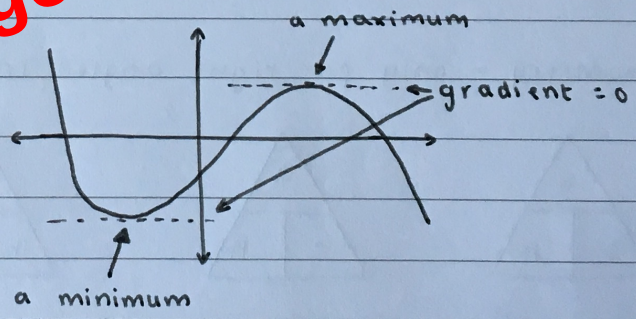
Maximum and minimum

$$\frac{dy}{dx} = 0$$



- work out x
- input x to work out y

example

find the maximum of $\frac{dy}{dx} = 20x - 10$

$0 = 20x - 10$

$10 = 20x$

$x = 0.5$

$y = x^{21} - 10x$

$y = 0.5^{21} - (10 \times 0.5)$

$y = -4.9$

maximum = $(0.5, 4.9)$