* Newton Raphson method to find the roots.

let us consider an eqn $f(x) = x^4 - x - 10 \rightarrow ①$

step① find $f'(x) = 4x^3 - 1 \rightarrow ②$

By putting 0, 1, 2, 3 --- in eq ①

$f(0) = 0 - 0 - 10 = -10$

$f(1) = 1 - 1 - 10 = -10 \longrightarrow$ Neg

$f(2) = 16 - 2 - 10 = 4 \nearrow$ pos

so $f(1) = -10$

$f(2) = 4$

roots lie b/w $f(1)$ & $f(2)$

let $x_0 = 2$

By Newton Raphson method

$$\boxed{x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}}$$

$$x_{i+1} = x_i - \frac{x_i^4 - x_i - 10}{4x_i^3 - 1}$$

$$= \frac{x_i(4x_i^3 - 1) - (x_i^4 - x_i - 10)}{4x_i^3 - 1}$$

$$x_{i+1} = \frac{3x_i^4 + 10}{4x_i^3 - 1} \quad //$$

@ $i = 0$

$$x_{i+1} \rightarrow x_1 = \frac{3x_0^4 + 10}{4x_0^3 - 1}$$

$$= \frac{3 \times 16 + 10}{4(2)^3 - 1} = 1.871$$

@ $i = 1$

$$x_2 = \frac{3x_1^4 + 10}{4x_1^3 - 1} = 1.856$$

@ $i=2$

$$x_{i+1} = x_3 = \frac{3x_2^4+10}{4x_2^3-1} = 1.856$$

so as $x_2 = x_3 = 1.856$ → This is the root.