☆ Secant method to find the roots

let us consider an example $x^3 - 5x + 1 = 0$, in interval $(0,1)$

$$f(x) = x^3 - 5x + 1$$

$x_0 = 0$

$x_1 = 1$

$\Rightarrow$ $x_0 = 0$; $f(x_0) = 0^3 - 5(0) + 1 = 1$

$x_1 = 1$; $f(x_1) = 1 - 5 + 1 = -3 \rightarrow$ -ve

Now $x_2 = \dfrac{x_0 f(x_1) - x_1 f(x_0)}{f(x_1) - f(x_0)}$

$= \dfrac{0 \times (-3) - 1(1)}{-3 - 1} = \dfrac{-1}{-4} = 0.25$

$x_2 = 0.25$; $f(x_2) = 0.0156 - 1.25 + 1 = -0.234$

$$x_3 = \dfrac{x_1 f(x_2) - x_2 f(x_1)}{f(x_2) - f(x_1)}$$

$= \dfrac{-3x - 0.234 - 0.25x - 3}{-0.234 - (-3)}$

$=$

We need to iterate till we get $f(x_n) \approx 0$

and we the root be x_n where $f(x_n) \approx 0$