

Newton-Raphson method ④

Formula.

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}, \quad n=0, 1, \dots$$

Example: Solve $2x^3 + x - 2 = 0$

by using Newton-Raphson method

$$f(0) = -2 < 0$$

$$f(1) = 1 > 0$$

The root lies between 0 and 1.

Take $x_0 = 1$.

$n=0$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$$f(x_0) = 1$$

$$f'(x) = 6x^2 + 1$$

$$f'(x_0) = 6(1)^2 + 1$$

$$f'(x_0) = 7$$

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = 1 - \frac{1}{7} = \frac{6}{7}$$

$$x_1 = 0.856$$