OPTIMISATION

We saw that for a function $f(x)$, we could find the root ($x$) satisfying $f(x) = 0$ iteratively:

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

We can use the similar idea to find the root ($x$) of a function $f'(x) = 0$.

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

A modified Newton-Raphson method may be defined by replacing the derivatives with:

$$f''(x) \approx \frac{f(x+h) - f(x-h)}{2h}$$

$$f'''(x) \approx \frac{f(x+h) - 2f(x) + f(x-h)}{h^2}$$

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

$$x_{i+1} = x_i - \frac{h}{2} \frac{f(x_i + h) - f(x_i - h)}{f(x_i + h) - 2f(x_i) + f(x_i - h)}$$