Numerical Methods Equations

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1 Taylor Series

$$f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \frac{f^{(3)}(a)}{3!}(x-a)^3 + \cdots \tag{1}$$

$$= \sum_{k=0}^{\infty} \frac{f^{(k)}(a)}{k!}(x-a)^k. \tag{2}$$

2 Taylor Series of e^x

$$e^x = 1 + x + \frac{x^2}{2!} + \cdots \tag{3}$$

$$\frac{1}{e^{-x}} = \frac{1}{1 - x + \frac{x^2}{2} + \cdots} \tag{4}$$

3 False Position

$$r = b - \frac{(b-a) \cdot f(b)}{f(b) - f(a)} \tag{5}$$

4 Newton's Method

$$x_{n+1} = x_n + \frac{f(x_n)}{f'(x_n)} \tag{6}$$

5 Secant Lines

$$x_3 = x_1 - \frac{(x_2 - x_1) \cdot f(x_1)}{f(x_2) - f(x_1)} \tag{7}$$

6 Modified Secant Method

$$x_2 = x_1 - \frac{f(x_1)\Delta}{f(x_1 + \Delta) - f(x_1)} \tag{8}$$