

$$f(x) = 12x^5 - 45x^4 + 40x^3 + 5$$

$$\frac{df(x)}{dx} = 60x^4 - 180x^3 + 120x^2$$

$$= 60x^2(x^2 - 3x + 2)$$

$$\frac{df(x)}{dx} = 60x^2(x-1)(x-2) = 0$$

$$x = 0$$

$$x = 1$$

$$x = 2$$

$$\frac{d^2f(x)}{dx^2} = 240x^3 - 540x^2 + 240x$$

$$= 0$$

$$\frac{d^2f(x)}{dx^2} \Big|_{x=1}$$

$$= -60 \text{ (max)}$$

$$\frac{d^2f(x)}{dx^2} \Big|_{x=2}$$

$$= 240 \text{ (min)}$$

One dimensional optimization method :- Nonlinear

Analytical Method

Calculus method

Requiring
no
derivatives

(Quadratic
Method)

Requiring
derivatives
Cubic
Direct root
Newton
Quasi Newton
Secant

Numerical Method

Elimination Method

- Unrestricted Search
- Exhaustive search
- Dichotomous search
- Fibonacci Method
- Golden-Section Method

Interpolation method

