Formula:

Rocky Sir:

$$x = f_x \times 10^E + g_x * 10^{E-d}.$$

d = number of mantissa.

Chopping error: $g_x * 10^{E-d}$.

Round off : $(g_x - 1) \times 10^{E-d}$ (if rounded) else

Max Root: $\dfrac{a_{n-1}}{a_n}$

Bracket: $\sqrt{\left(\dfrac{a_{n-1}}{a_n}\right)^2 - 2\left(\dfrac{a_{n-1}}{a_n}\right)} \;. = |x_{max}|$

Bisection: $x_0 = \dfrac{x_1 + x_2}{2}$

False Position: $X_0 = x_1 - f(x_1)\dfrac{x_2 - x_1}{f(x_2) - f(x_1)}$

Newton Raphson: $x_2 = x_1 - \dfrac{f(x_1)}{f'(x_1)}$

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

Linear interpolation:

$$f(x) = f(x_1) + \{f(x_2) - f(x_1)\} \times \frac{x - x_1}{x_2 - x_1}$$

~~lang~~ lagrange interpolation:

$$f(x) = f_0 l_0(x) + f_1 l_1(x) + \dots\dots$$

$$l_0(x) = \frac{(x - x_2)(x - x_1)}{(x_0 - x_2)(x_0 - x_1)}$$ (for 3 data points x_0, x_1, x_2)

$$l_1(x) = \frac{(x - x_0)(x - x_2)}{(x_1 - x_0)(x_1 - x_2)}$$

$$\boxed{\sum_{i=1}^{n} f(x)\, l_i(x) = P(x) \qquad l_i = \prod_{j=0}^{j=n,\, j\neq i} \frac{x - x_j}{x_i - x_j}}$$

in general.

Newton:

$$p(x) = f[x_0] + f[x_0, x_1](x - x_0) + f[x_0, x_1, x_2](x - x_0)(x - x_1) + \dots\dots$$

$$f[x_0] = f(x_0)$$

$$f[x_0, x_1] = \frac{f[x_1] - f[x_0]}{x_1 - x_0}$$

$$f[x_0, x_1, x_2] = \frac{f[x_2, x_1] - f[x_1, x_0]}{x_2 - x_0}$$

করে (1) eqn

Newton Raphson:

$$f(x) = \frac{f_0}{0!} + \frac{\Delta f_0 (s)}{1!} + \Delta^2 f_0 \frac{(s)(s-1)}{2!} + \Delta^3 f_0 \frac{(s)(s-1)(s-2)}{3!}$$

Least Square Regration:

$$b = \frac{\sum x_1 y_1 - \sum x \sum y}{\sum x^2 - (\sum x)^2}$$

$$a = \frac{\sum y_1}{n} - b \frac{\sum x_i}{n} = \bar{y} - b\bar{x}$$

Eigan Value:

Normal Method

$|A - \lambda I| = 0.$ λ এর ভ্যালু = eigan vale.

λ এর পলিনমিয়াল থেকে ... main eqn এ বসায়ে

~~[A−λI]~~ এ λ এর ভ্যালু ~~পলিনমিয়াল~~

[A] coefficient matrix পাইলাম

$$[A][V] = 0$$

↑ মানে eigan vector (বের করতে হবে)

Fadeev Leverrier:

For 3X3 matrix

$$\lambda^3 - P_1\lambda^2 - P_2\lambda - P_3 = 0 \quad \text{———} \quad (1)$$

$P_1 = t_r A_1$ = A_1 matrix এর ডায়াগনালের যোগফল

$A_1 = A$

$\boxed{A = \text{coefficient matrix}}$

$\boxed{ax_1 + by_1 + cz_1 = \lambda x_1}$ ← এই ফরমেটে নিয়ে এর পর coefficient matrix ~~বের~~ বের করতে হবে।

পরের P এর জন্য

$A_2 = A \cdot (A_1 - P_1(I)) \Rightarrow P_2 = (t_r A_2/2)$

$A_3 = A(A_2 - P_2(I)) \Rightarrow P_3 = (t_r A_3/3)$

এর পর, P এর ভ্যালু বসায়, → (1) polynomial থেকে λ এর ভ্যালু বের করলে eigan value পাওয়া যায়।

Power Method:

$Y = AX$

$X = \frac{1}{K} Y$

বার বার এইটা চলবে যতক্ষণ না দুইটা সেইম ভ্যালু আসে

K = max value of Y

initially $X = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$ ধরে নিতে হইবে

A = coefficient ~~max~~ matrix

Salim Sir

Gauss Sheidal: x, এর জন্য বের করো ① eqn এ $y=0, z=0$.

RK:

$$K_1 = hf(x_0, y_0)$$

$$K_2 = hf\left(x_0 + \frac{h}{2}, y_0 + \frac{K_1}{2}\right)$$

$$K_3 = hf\left(x_0 + \frac{h}{2}, y_0 + \frac{K_2}{2}\right)$$

$$K_4 = hf(x_0 + h, y_0 + K_3)$$

Eular:

$$y_{n+1} = y_n + hf(x_0, y_0)$$

Modified Eular:

$$y_{n+1}^{(1)} = y_n + h\,\frac{f(x_n, y_n) + f(x_{n+1}, y_{n+1}^{A(1)})}{2}$$

$$y_{n+1}^{(2)} = y_n + h\,\frac{f(x_n, y_n) + f(x_{n+1}, y_{n+1}^{(1)})}{2}$$

This process will continue untill $y_{n+1}^{(i)} = y_{(n+1)}^{(i+1)}$

এরপর, $x = x_0 + h$, $y =$ found ~~the~~ from

And the full process continues again.

General Quadrature formula:

$$I = n y_0 + \frac{n^2}{2} \Delta y_0 + \left(\frac{n^3}{2} - \frac{n^2}{2}\right) \frac{\Delta^2 y_0}{2!} + \left(\frac{n^4}{4} - n^3 + n^2\right) \frac{\Delta^3 y_0}{3!} + \cdots$$

Trapezoidal Rule:

$$\int_0^{x+nh} y\,dx = h\left(\frac{1}{2}(y_0 + y_n) + (y_1 + y_2 + y_3 \cdots y_{n-1})\right)$$

Simpson 1/3:

$$\int_0^{x+nh} y\,dx = \frac{1}{3} h \left[(y_0 + y_n) + 4(y_1 + y_3 \cdots y_{n-1}) + 2(y_2 + y_4 + \cdots + y_{n-2}) \right]$$

Simpson 3/8:

$$\int_0^{x+nh} y\,dx = \frac{3}{8} h \left[(y_0 + y_n) + 3(y_1 + y_2 + y_4 + y_5 \cdots y_{n-2} + y_{n-1}) + 2(y_3 + y_6 + \cdots y_{n-3}) \right]$$

Jacobi Iteration:

same as gauss sheidal যদি ① iteration equation এ value $\{x, y, z\} = 0$ ধরে করতে হয়।

Method of factorization:

$$L \cdot Y = [c]$$ ← constant matrix of the equations.

বের করো।

এখন থেকে (Y) Y এর অনুরূপ

same

$$U \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$