① Syarat : $f(a) \cdot f(b) < 0$

$: (1+1-3)(2^4+2-3)$

$: (-1)(2^4+2-3) < 0 \rightarrow$ Memenuhi

| a | b | c | f(a) | f(b) | f(c) |
|---|---|---|---|---|---|
| 1,1 | 1,8 | 1,45 | -0,1359 | 9,2976 | 2,841 |
| 1,1 | 1,45 | 1,275 | -0,1359 | 2,841 | 0,917 |
| 1,1 | 1,275 | 1,1875 | -0,1359 | 0,917 | 0,176 |
| 1,1 | 1,1875 | 1,14375 | -0,1359 | 0,176 | -0,144 |
| 1,14375 | 1,1875 | 1,1656 | -0,144 | 0,176 | 0,0114 |

Jadi, akar dari $f(x) = x^4+x-3 \rightarrow x \approx 1,1656$

② Dekomposisi Choleskey A

$A = LL^T$

Elemen non-diagonal : $l_{ki} = \dfrac{a_{ki} - \sum_{j=1}^{i-1} l_{ij} l_{kj}}{l_{ii}}$ | elemen diagonal : $l_{kk} = \sqrt{a_{kk} - \sum_{j=1}^{k-1} l_{kj}^2}$

$$L = \begin{bmatrix} l_{11} & 0 & 0 \\ l_{21} & l_{22} & 0 \\ l_{31} & l_{32} & l_{33} \end{bmatrix}$$

$l_{11} = \sqrt{1-0} = 1$

$l_{21} = \dfrac{1-0}{1} = 1 \qquad l_{22} = \sqrt{2-1} = 1$

$l_{31} = \dfrac{1-0}{1} = 1 \qquad l_{32} = \dfrac{2-(1)(1)}{1} = 1 \qquad l_{33} = \sqrt{3-(1+1)} = 1$

$$L = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \qquad L^T = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

$Ax = B$

$LL^T x = B$

$$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ 3/2 \\ 3 \end{bmatrix} \qquad \rightarrow X = \begin{bmatrix} 1/2 \\ -1 \\ 3/2 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x_1+x_2+x_3 \\ x_2+x_3 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ 3/2 \\ 3 \end{bmatrix} \implies x_1 = 1/2,\ x_2 = -1,\ x_3 = 3/2$$

4)

| X | f(x) | ST-1 | ST-2 | ST-3 |
|---|---|---|---|---|
| 4 | 2,00000 | 0,23607 | -0,011325 | 0,000915 |
| 5 | 2,23607 | 0,21342 | -0,00858 | |
| 6 | 2,44949 | 0,19626 | | |
| 7 | 2,64575 | | | |

$$F(x) \approx P_3(x) = \underbrace{\underbrace{2 + 0,23607(x-4)}_{P_1(x)} - 0,011325(x-4)(x-5)}_{P_2(x)} + 0,000915(x-4)(x-5)\cancel{(x-6)}$$

$P_1(4.5) = 1,05572$
$P_2(4.5) = 0,82922$
$P_3(4.5) = 0,71942$