

Given:

$$\begin{aligned}x_1 &= 2.95 \\x_3 &= -1.45 \\x_1 - x_2 &= 1.23 \\x_1 - x_4 &= 1.61 \\x_2 - x_4 &= 0.45\end{aligned}$$

$$\begin{aligned}x_2 &= 1.74 \\x_4 &= 1.32 \\x_1 - x_3 &= 4.45 \\x_2 - x_3 &= 3.21 \\x_3 - x_4 &= -2.75\end{aligned}$$



can be seen as

$$\begin{aligned}1 \cdot x_1 + 0 \cdot x_2 + 0 \cdot x_3 + 0 \cdot x_4 &= 2.95 \\0 \cdot x_1 + 1 \cdot x_2 + 0 \cdot x_3 + 0 \cdot x_4 &= 1.74 \\0 \cdot x_1 + 0 \cdot x_2 + 1 \cdot x_3 + 0 \cdot x_4 &= -1.45 \\0 \cdot x_1 + 0 \cdot x_2 + 0 \cdot x_3 + 1 \cdot x_4 &= 1.32 \\1 \cdot x_1 + (-1) \cdot x_2 + 0 \cdot x_3 + 0 \cdot x_4 &= 1.23 \\1 \cdot x_1 + (-1) \cdot x_3 + 0 \cdot x_2 + 0 \cdot x_4 &= 4.45 \\1 \cdot x_1 + 0 \cdot x_2 + 0 \cdot x_3 + (-1) \cdot x_4 &= 1.61 \\0 \cdot x_1 + 0 \cdot x_2 + (1) \cdot x_3 + (-1) \cdot x_4 &= -2.75 \\0 \cdot x_1 + 0 \cdot x_2 + (1) \cdot x_3 + (-1) \cdot x_4 &= -2.75 \\0 \cdot x_1 + 1 \cdot x_2 + 0 \cdot x_3 + (-1) \cdot x_4 &= 0.45 \\0 \cdot x_1 + 1 \cdot x_2 + (-1) \cdot x_3 + 0 \cdot x_4 &= 3.21\end{aligned}$$

$$AX=B$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & -1 & 0 & 0 \\ 1 & 0 & -1 & 0 \\ 1 & 0 & 0 & -1 \\ 0 & 0 & 1 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 1 & -1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 2.95 \\ 1.74 \\ -1.45 \\ 1.32 \\ 1.23 \\ 4.45 \\ 1.61 \\ -2.75 \\ 0.45 \\ -2.75 \end{bmatrix}$$

using least square
we solve to
get x_1, x_2, x_3, x_4 .

using $A^T A x = A^T B$

we get values of $x_1 = 2.96$, $x_2 = 1.74$, $x_3 = -1.46$, $x_4 = 1.31$

So, comparing computed value with direct measurement we have

$$\text{residual } x_1 = |2.96 - 2.95| = 0.01 \quad \text{residual } x_3 = |-1.46 + 1.45| = 0.01$$

$$\text{residual } x_2 = |1.74 - 1.74| = 0 \quad \text{residual } x_4 = |1.31 - 1.32| = 0.01$$

Since we find residual are small hence, computed values are close to direct measurement.
