

$$\begin{aligned} X_1 + X_2 + 0 + 0 &= 1 \\ 0 + 0 + X_3 + X_4 &= 1 \\ -1.9X_1 + 0 + X_3 + 0 &= 0 \\ 0 - 0.6X_2 + 0 + X_4 &= 0 \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ -1.9 & 0 & 1 & 0 \\ 0 & -0.6 & 0 & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}$$

$$X = A \setminus B = A^{-1} * B$$

$$A^{-1} = \frac{1}{|A|} * \text{adj}(A)$$

$$|A| = \begin{vmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ -1.9 & 0 & 1 & 0 \\ 0 & -0.6 & 0 & 1 \end{vmatrix} = 1 \begin{vmatrix} 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ -0.6 & 0 & 1 & 0.6 \end{vmatrix} - 1 \begin{vmatrix} 0 & 1 & 1 & 0 \\ -1.9 & 1 & 0 & -1.9 \\ 0 & 0 & 1 & 0 \end{vmatrix} = [0 - (-0.6)] - [0 + 1.9]$$

$$\boxed{|A| = -1.3}$$

$$\text{adj}(A) =$$

$$\begin{vmatrix} 0 & 1 & 1 & | & 0 & 1 \\ 0 & 1 & 0 & | & 0 & 1 \\ -0.6 & 0 & 1 & | & 0.6 & 0 \end{vmatrix} - \begin{vmatrix} 0 & 1 & 1 & | & 0 & 1 \\ -1.9 & 1 & 0 & | & -1.9 & 1 \\ 0 & 0 & 1 & | & 0 & 0 \end{vmatrix} + \begin{vmatrix} 0 & 0 & 1 & | & 0 & 0 \\ -1.9 & 0 & 0 & | & -1.9 & 0 \\ 0 & -0.6 & 1 & | & 0 & -0.6 \end{vmatrix} - \begin{vmatrix} 0 & 0 & 1 & | & 0 & 0 \\ -1.9 & 0 & 1 & | & -1.9 & 0 \\ 0 & -0.6 & 0 & | & 0 & -0.6 \end{vmatrix}$$

$$+ [0 - (-0.6)] = 0.6$$

$$- [0 - (-1.9)] = -1.9$$

$$+ [((-1.9)(-0.6)) - 0] = 1.14 - [(-1.9)(-0.6) - 0] = -1.14$$

$$- \begin{vmatrix} 1 & 0 & 0 & | & 1 & 0 \\ 0 & 1 & 0 & | & 0 & 1 \\ -0.6 & 0 & 1 & | & -0.6 & 0 \end{vmatrix} + \begin{vmatrix} 1 & 0 & 0 & | & 1 & 0 \\ -1.9 & 1 & 0 & | & -1.9 & 1 \\ 0 & 0 & 1 & | & 0 & 0 \end{vmatrix}$$

$$- [1 - 0] = -1$$

$$+ [1 - 0] = 1$$

$$- \begin{vmatrix} 1 & 1 & 0 & | & 1 & 1 \\ -1.9 & 0 & 0 & | & -1.9 & 0 \\ 0 & -0.6 & 1 & | & 0 & 0.6 \end{vmatrix} + \begin{vmatrix} 1 & 1 & 0 & | & 1 & 1 \\ -1.9 & 0 & 1 & | & -1.9 & 0 \\ 0 & -0.6 & 0 & | & 0 & 0.6 \end{vmatrix}$$

$$- [0 - (-1.9)] = -1.9 + [0 - (-0.6)] = 0.6$$

$$+ \begin{vmatrix} 1 & 0 & 0 & | & 1 & 0 \\ 0 & 1 & 1 & | & 0 & 1 \\ 0.6 & 0 & 1 & | & 0.6 & 0 \end{vmatrix} - \begin{vmatrix} 1 & 0 & 0 & | & 1 & 0 \\ 0 & 1 & 1 & | & 0 & 1 \\ 0 & 0 & 1 & | & 0 & 0 \end{vmatrix}$$

$$+ [1 - 0] = 1$$

$$- [1 - 0] = -1$$

$$+ \begin{vmatrix} 1 & 1 & 0 & | & 1 & 1 \\ 0 & 0 & 1 & | & 0 & 0 \\ 0 & -0.6 & 1 & | & 0 & 0.6 \end{vmatrix} - \begin{vmatrix} 1 & 1 & 0 & | & 1 & 1 \\ 0 & 0 & 1 & | & 0 & 0 \\ 0 & -0.6 & 0 & | & 0 & -0.6 \end{vmatrix}$$

$$+ [0 - (-0.6)] = 0.6$$

$$- [0 - (-0.6)] = -0.6$$

$$- \begin{vmatrix} 1 & 0 & 0 & | & 1 & 0 \\ 0 & 1 & 1 & | & 0 & 1 \\ 0 & 1 & 0 & | & 0 & 1 \end{vmatrix}$$

$$- [0 - 1] = 1$$

$$+ \begin{vmatrix} 1 & 0 & 0 & | & 1 & 0 \\ 0 & 1 & 1 & | & 0 & 1 \\ -1.9 & 1 & 0 & | & -1.9 & 1 \end{vmatrix}$$

$$+ [0 - 1] = -1$$

$$- \begin{vmatrix} 1 & 1 & 0 & | & 1 & 1 \\ 0 & 0 & 1 & | & 0 & 0 \\ -1.9 & 0 & 0 & | & -1.9 & 0 \end{vmatrix}$$

$$- [(-1.9) - 0] = 1.9$$

$$+ \begin{vmatrix} 1 & 1 & 0 & | & 1 & 1 \\ 0 & 0 & 1 & | & 0 & 0 \\ -1.9 & 0 & 1 & | & -1.9 & 0 \end{vmatrix}$$

$$+ [-1.9 - 0] = -1.9$$

$$\text{adj}(A) = \begin{bmatrix} 0.6 & -1.9 & 1.14 & -1.14 \\ -1 & 1 & -1.9 & 0.6 \\ 1 & -1 & 0.6 & -0.6 \\ 1 & -1 & 1.9 & -1.9 \end{bmatrix}$$

$$A^{-1} = \frac{1}{|A|} \times \text{adj}(A)$$

$$= \frac{1}{-1.3} \times \begin{bmatrix} 0.6 & -1.9 & 1.14 & -1.14 \\ -1 & 1 & -1.9 & 0.6 \\ 1 & -1 & 0.6 & -0.6 \\ 1 & -1 & 1.9 & -1.9 \end{bmatrix}$$

$$= \begin{bmatrix} -0.4615 & 1.4615 & -0.8769 & 0.8769 \\ 0.7692 & -0.7692 & 1.4615 & -0.4615 \\ -0.7692 & 0.7692 & -0.4615 & 0.4615 \\ -0.7692 & 0.7692 & -1.4615 & 1.4615 \end{bmatrix}$$

لازم  
اضد  
Transpose  
فيصبح

$$A^{-1} = \begin{bmatrix} -0.4615 & 0.7692 & -0.7692 & -0.7692 \\ 1.4615 & -0.7692 & 0.7692 & 0.7692 \\ -0.8769 & 1.4615 & -0.4615 & -1.4615 \\ 0.8769 & -0.4615 & 0.4615 & 1.4615 \end{bmatrix}$$

$$X = A^{-1} * B$$

$$\begin{bmatrix} -0.4615 & 0.7692 & -0.7692 & -0.7692 \\ 1.4615 & -0.7692 & 0.7692 & 0.7692 \\ -0.8769 & 1.4615 & -0.4615 & -1.4615 \\ 0.8769 & -0.4615 & 0.4615 & 1.4615 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 0.3077 \\ 0.6923 \\ 0.5846 \\ 0.4154 \end{bmatrix}$$

المصفوفة الناتجة لازم  
تكون مكونة من 1  
العمدة  
مستوف

$$X_A = X(1), X_B = X(2), Y_A = X(3)$$

$$Y_B = X(4)$$

$$\begin{bmatrix} 1 & -4 & 3 \\ 3 & 1 & -2 \\ 2 & 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -7 \\ 14 \\ 5 \end{bmatrix}$$

$$X = A \setminus B$$

$$X = \text{inv}(A) * B = A^{-1} * B$$

$$A^{-1} = \frac{1}{\det(A)} * \text{adj}(A)$$

$$\det(A) = \begin{vmatrix} 1 & -4 & 3 & | & 1 & -4 \\ 3 & 1 & -2 & | & 3 & 1 \\ 2 & 1 & 1 & | & 2 & 1 \end{vmatrix}$$

$$[(1) + 16 + 9] - [-12 - 2 + 6]$$

$$[26] - [-8] = \boxed{34} = \det(A)$$

$$\text{adj}(A) = \begin{vmatrix} \begin{vmatrix} 1 & -2 \\ 1 & 1 \end{vmatrix} & \begin{vmatrix} 3 & -2 \\ 2 & 1 \end{vmatrix} & \begin{vmatrix} 3 & 1 \\ 2 & 1 \end{vmatrix} \\ \begin{vmatrix} -4 & 3 \\ 1 & 1 \end{vmatrix} & \begin{vmatrix} 1 & 3 \\ 2 & 2 \end{vmatrix} & \begin{vmatrix} 1 & -4 \\ 2 & 1 \end{vmatrix} \\ \begin{vmatrix} -4 & 3 \\ 1 & -2 \end{vmatrix} & \begin{vmatrix} 1 & 3 \\ 3 & -2 \end{vmatrix} & \begin{vmatrix} 1 & -4 \\ 3 & 1 \end{vmatrix} \end{vmatrix} = \begin{vmatrix} 3 & 7 & 1 \\ 7 & 5 & -9 \\ 5 & 11 & 13 \end{vmatrix}$$

$$A^{-1} = \frac{1}{\det(A)} * \text{adj}(A) = \frac{1}{34} \begin{vmatrix} 3 & 7 & 1 \\ 7 & 5 & -9 \\ 5 & 11 & 13 \end{vmatrix} = \begin{vmatrix} 0.0882 & -0.2059 & 0.0294 \\ 0.2059 & -0.1471 & -0.2647 \\ 0.1471 & 0.3235 & 0.3823 \end{vmatrix}$$

$$= \begin{vmatrix} 0.0882 & 0.2059 & 0.1471 \\ -0.2059 & -0.1471 & 0.3235 \\ 0.0294 & -0.2647 & 0.3823 \end{vmatrix}$$

$$X = A^{-1} * B = \begin{vmatrix} 0.0882 & 0.2059 & 0.1471 \\ -0.2059 & -0.1471 & 0.3235 \\ 0.0294 & -0.2647 & 0.3823 \end{vmatrix} * \begin{vmatrix} -7 \\ 14 \\ 5 \end{vmatrix}$$

$$X = \begin{bmatrix} 3 \\ 1 \\ -2 \end{bmatrix} \begin{matrix} x_1 \\ x_2 \\ x_3 \end{matrix}$$

$$X_1 = L, \quad X_2 = U \quad \text{للنوع}$$

$$X_A X_1 + y_A X_2 = 0.4 * 100$$

$$X_B X_1 + y_B X_2 = 0.6 * 100$$

$$a = [X_A, y_A : X_B, y_B];$$

$$b = [0.4 * 100 ; 0.6 * 100];$$

$$X = a \setminus b$$

$$L = X(1), \quad U = X(2)$$