

$$A_2 = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ -1 & 1 & 1 & 0 & 0 \\ 0 & -1 & 1 & 1 & 0 \\ 0 & 0 & -1 & 1 & 1 \\ 0 & 0 & 0 & -1 & 1 \end{bmatrix} \xrightarrow{\text{Row 1} + \text{Row 2} \rightarrow \text{Row 1}} \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ 0 & 2 & 1 & 0 & 0 \\ 0 & -1 & 1 & 1 & 0 \\ 0 & 0 & -1 & 1 & 1 \\ 0 & 0 & 0 & -1 & 1 \end{bmatrix}$$

$$\xrightarrow{2 \text{ Row 2} + \text{Row 1} \rightarrow \text{Row 2}} \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 2 & 2 & 0 \\ 0 & 0 & -1 & 1 & 1 \\ 0 & 0 & 0 & -1 & 1 \end{bmatrix}$$

$$\xrightarrow{2 \text{ Row 2} + \text{Row 3} \rightarrow \text{Row 3}} \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 2 & 2 & 0 \\ 0 & 0 & 0 & 2 & 2 \\ 0 & 0 & 0 & -1 & 1 \end{bmatrix}$$

$$\xrightarrow{2 \text{ Row 2} + \text{Row 4} \rightarrow \text{Row 4}} \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 2 & 2 & 0 \\ 0 & 0 & 0 & 2 & 2 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\det A = \frac{1 \times 2 \times 2 \times 2 \times 1}{2 \times 2 \times 2} = 1$$