

1. Compute the determinants of

$$A = \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 2 & 2 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 2 & 2 & 2 & 2 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 & 0 \\ 2 & 2 & 2 & 2 & 2 & 2 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & 2 & 0 & 0 & 0 & 0 \\ 2 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 & 0 & 0 \\ 0 & 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 2 & 1 \end{bmatrix}$$

$$|A| = (-1)^3 = -1$$

$$|B| = 1 \cdot 2 \cdot 1 \cdot 2 \cdot 1 \cdot 2 = 8$$

$$C \sim \begin{bmatrix} 1 & 2 & 0 & 0 & 0 & 0 \\ 0 & -3 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 & 0 & 0 \\ 0 & 0 & -3 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & -3 & -1 \end{bmatrix}$$

$$|C| = 1 \cdot (-3) \cdot 1 \cdot (-3) \cdot 1 \cdot (-3) = -27$$

2. Compute the determinant of

$$D = \begin{bmatrix} 2 & 4 & 0 & 0 & 0 & 0 \\ 6 & 3 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & -2 & 0 & 0 \\ 0 & 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 5 & 10 \\ 0 & 0 & 0 & 0 & 2 & 1 \end{bmatrix}$$

$$|D| = 2 \cdot 3 \cdot (-1) \cdot 1 \cdot 5 \cdot 1 \cdot |C| = -30$$

3. Compute the determinant of $ABCD$, where A , B , C and D are as above.

$$|ABCD| = (-1)(8)(-27)(-30)$$