1. (a)

$$A = \begin{bmatrix} \pi & \sqrt{2} & e \\ 1 & 0 & -1 \end{bmatrix}$$

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

$$AI = \begin{bmatrix} \pi & \sqrt{2} & e \\ 1 & 0 & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \pi + 0 + 0 & 0+\sqrt{2}+0 & 0+0+e \\ 1+0+0 & 0+0+0 & 0+0+(-1) \end{bmatrix}$$

$$= \begin{bmatrix} \pi & \sqrt{2} & e \\ 1 & 0 & -1 \end{bmatrix}$$

So, AI = A

1. (b)

$$B = \begin{bmatrix} \dfrac{1}{2} & 4 \\ 9 & 4 \\ -6 & 0 \end{bmatrix}$$

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

$$IB = \begin{bmatrix} \dfrac{1}{2} & 4 \\ 9 & 4 \\ -6 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \dfrac{1}{2} & 4 \\ 9 & 4 \\ -6 & 0 \end{bmatrix}$$

So, BI = B

1. (c)

$$C = \begin{pmatrix} -2 & 3 & 1 \\ 0 & 0 & 5 \\ 4 & -1 & 0 \end{pmatrix}$$

$$I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$CI = \begin{pmatrix} -2 & 3 & 1 \\ 0 & 0 & 5 \\ 4 & -1 & 0 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$= \begin{pmatrix} -2 & 3 & 1 \\ 0 & 0 & 5 \\ 4 & -1 & 0 \end{pmatrix}$$

$$IC = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} -2 & 3 & 1 \\ 0 & 0 & 5 \\ 4 & -1 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} -2 & 3 & 1 \\ 0 & 0 & 5 \\ 4 & -1 & 0 \end{pmatrix}$$

So, CI = C = IC

2.(i)

$$AB = \begin{pmatrix} \pi & \sqrt{2} & e \\ 1 & 0 & -1 \end{pmatrix} \begin{pmatrix} 1/2 & 4 \\ 9 & 4 \\ -6 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} \pi/2 + 9\sqrt{2} - 6e & 4\pi + 4\sqrt{2} + 0 \\ 1/2 + 0 + 6 & 4 + 0 + 0 \end{pmatrix}$$

$$= \begin{pmatrix} -2.009 & 18.225 \\ 6.5 & 4 \end{pmatrix}$$

2.(ii)

$$A' = \begin{pmatrix} \pi & 1 \\ \sqrt{2} & 0 \\ e & -1 \end{pmatrix}$$

$$A'+B = \begin{pmatrix} \pi & 1 \\ \sqrt{2} & 0 \\ e & -1 \end{pmatrix} + \begin{pmatrix} 1/2 & 4 \\ 9 & 4 \\ -6 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} 3.642 & 5 \\ 10.414 & 4 \\ -3.282 & -1 \end{pmatrix}$$

2.(iii)

$$C' = \begin{pmatrix} -2 & 0 & 4 \\ 3 & 0 & -1 \\ 1 & 5 & 0 \end{pmatrix}$$

$$2C - C' = 2 \begin{pmatrix} -2 & 3 & 1 \\ 0 & 0 & 5 \\ 4 & -1 & 0 \end{pmatrix} - \begin{pmatrix} -2 & 0 & 4 \\ 3 & 0 & -1 \\ 1 & 5 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} -4 & 6 & 2 \\ 0 & 0 & 10 \\ 8 & -2 & 0 \end{pmatrix} - \begin{pmatrix} -2 & 0 & 4 \\ 3 & 0 & -1 \\ 1 & 5 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} -6 & 6 & 6 \\ 3 & 0 & 9 \\ 9 & 3 & 0 \end{pmatrix}$$

2.(iv)

$$5C + 2C' = 5 \begin{pmatrix} -2 & 3 & 1 \\ 0 & 0 & 5 \\ 4 & -1 & 0 \end{pmatrix} + 2 \begin{pmatrix} -2 & 0 & 4 \\ 3 & 0 & -1 \\ 1 & 5 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} -10 & 15 & 5 \\ 0 & 0 & 25 \\ 20 & -5 & 0 \end{pmatrix} + \begin{pmatrix} -4 & 0 & 8 \\ 6 & 0 & -2 \\ 2 & 10 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} -14 & 15 & 13 \\ 6 & 0 & 23 \\ 22 & 5 & 0 \end{pmatrix}$$

2.(v)

$$CC' = \begin{pmatrix} -2 & 3 & 1 \\ 0 & 0 & 5 \\ 4 & -1 & 0 \end{pmatrix} \begin{pmatrix} -2 & 0 & 4 \\ 3 & 0 & -1 \\ 1 & 5 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} 14 & 5 & -11 \\ 5 & 25 & 0 \\ -11 & 0 & 17 \end{pmatrix}$$