

$$a) \begin{pmatrix} -3 & 4 & 2 \\ 2 & -5 & -4 \\ 2 & 3 & 2 \end{pmatrix} \times \begin{pmatrix} 2 & 2 & -3 & 4 \\ -3 & 1 & 2 & -1 \\ 1 & -4 & -1 & 3 \end{pmatrix}$$

$$\begin{pmatrix} -6 - 12 + 2 & -6 + 4 - 8 & 9 + 8 - 2 & -17 - 4 + 6 \\ 4 + 15 - 4 & 4 - 5 + 16 & -6 - 10 + 4 & 8 + 5 - 12 \\ 4 - 9 + 2 & 4 + 3 - 8 & -6 + 6 - 2 & 8 - 3 + 6 \end{pmatrix}$$

$$\begin{pmatrix} -16 & -10 & 15 & -10 \\ 15 & 15 & -12 & 1 \\ -3 & -1 & -2 & 11 \end{pmatrix}$$

$$b) \begin{pmatrix} 8 & -26 & -4 \\ -32 & -22 & -2 \end{pmatrix}$$

$$c) \begin{pmatrix} (1-i+3) + (-4-6i) + (-5-10i) & (4i-12) + (6i-9) + (2+4i) \\ (1+2i) + (-2-2i) + (10i+15) & (-4-8i) + (3i-3) + (4i-6) \\ (-2i-1) + (6i+4) + (15i+20) & (8i+4) + (9-6i) + (-6i-8) \end{pmatrix}$$

$$\begin{pmatrix} -6-17i & -19+14i \\ 14+10i & -13-9i \\ 23+19i & 5-4i \end{pmatrix}$$

$$\begin{vmatrix} 8 & -4 & 6 \\ 2 & 4 & 1 \\ -3 & -2 & 4 \end{vmatrix} = 2 \cdot \begin{vmatrix} 4 & -2 & 3 \\ 2 & 4 & 1 \\ -3 & -2 & 4 \end{vmatrix}$$

$$= 2 \cdot 2 \cdot \begin{vmatrix} 4 & -1 & 3 \\ 2 & 2 & 1 \\ -3 & -1 & 4 \end{vmatrix} = 4 \cdot \begin{matrix} 32 + 3 - 6 \\ \ominus \\ -18 - 8 - 4 \end{matrix}$$

$$\Rightarrow 4 \cdot [(32 + 3 - 6) - (-18 - 8 - 4)]$$

$$\Rightarrow 4 \cdot 59 = 236$$

$$b) \quad \frac{1}{4} \cdot 2 \begin{pmatrix} 2 & 1 & -4 \\ 1 & 2 & -1 \\ -1 & -3 & 4 \end{pmatrix}$$

$$\frac{1}{2} \cdot \begin{pmatrix} 16 + 1 + 12 \\ \ominus \\ 8 + 4 + 6 \end{pmatrix} = \frac{1}{2} \cdot (29 - 18) = \frac{1}{2} = 5 \frac{1}{2}$$

$$c) \quad -3 \cdot 2 \begin{pmatrix} 1 & 3 & -4 \\ 3 & 2 & -2 \\ -3 & -1 & 4 \end{pmatrix} = -6 \cdot 2 \cdot \begin{pmatrix} 1 & 3 & -2 \\ 3 & 2 & -1 \\ -3 & -1 & 2 \end{pmatrix}$$

$$-12 \cdot \begin{pmatrix} 4 + 9 + 6 \\ \ominus \\ +12 + 18 + 11 \end{pmatrix} = -12 \cdot (19 - 31) = -12 \cdot (-12)$$

$$= 144$$