

Homework Solutions

Section 4.4 : 35, 41, 57

$$35) B^2 = \begin{matrix} & \begin{matrix} \begin{matrix} -3 & 1 \end{matrix} \\ \begin{matrix} 2 & 5 \end{matrix} \end{matrix} \\ \begin{matrix} B \\ 2 \times 2 \end{matrix} \end{matrix} \begin{matrix} \begin{matrix} \begin{matrix} -3 & 1 \end{matrix} \\ \begin{matrix} 2 & 5 \end{matrix} \end{matrix} \\ \begin{matrix} B \\ 2 \times 2 \end{matrix} \end{matrix} \rightarrow 2 \times 2 \begin{bmatrix} \cdot & \cdot \\ \cdot & \cdot \end{bmatrix}$$

$$\begin{bmatrix} -3(-3) + 1(2) & -3(1) + 1(5) \\ 2(-3) + 5(2) & 2(1) + 5(5) \end{bmatrix} = \begin{bmatrix} 11 & 2 \\ 4 & 27 \end{bmatrix}$$

$$41) \begin{matrix} 3B & A \\ \begin{matrix} 2 \times 2 & 2 \times 3 \\ \downarrow & \downarrow \\ 2 \times 3 \end{matrix} \end{matrix} + \begin{matrix} 4A & C \\ \begin{matrix} 2 \times 3 & 3 \times 3 \\ \downarrow & \downarrow \\ 2 \times 3 \end{matrix} \end{matrix}$$

$$BA = \begin{bmatrix} -3 & 1 \\ 2 & 5 \end{bmatrix} \begin{bmatrix} 2 & -1 & 3 \\ 0 & 4 & -2 \end{bmatrix} = \begin{bmatrix} -6 & 7 & -11 \\ 4 & 18 & 4 \end{bmatrix}$$

$$3BA = \begin{bmatrix} -18 & 21 & -33 \\ 12 & 54 & -12 \end{bmatrix}$$

$$AC = \begin{bmatrix} 2 & -1 & 3 \\ 0 & 4 & -2 \end{bmatrix} \begin{bmatrix} -1 & 0 & 2 \\ 4 & -3 & 1 \\ -2 & 3 & 5 \end{bmatrix} = \begin{bmatrix} -12 & 12 & 18 \\ 20 & -18 & -6 \end{bmatrix}$$

$$4AC = \begin{bmatrix} -48 & 48 & 72 \\ 80 & -72 & -24 \end{bmatrix}$$

$$3BA + 4AC = \begin{bmatrix} -66 & 69 & 39 \\ 92 & -18 & -36 \end{bmatrix}$$

57)

$$\begin{matrix} A & B & C \\ \begin{bmatrix} 1 & -2 \\ 2 & -3 \end{bmatrix} & \begin{bmatrix} a & b \\ c & d \end{bmatrix} & = \begin{bmatrix} 1 & 0 \\ 3 & 2 \end{bmatrix} \end{matrix}$$

$2 \times 2 \quad \quad \quad 2 \times 2$

$$AB = \begin{bmatrix} a + (-2)c & b - 2d \\ 2a - 3c & 2b - 3d \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 3 & 2 \end{bmatrix}$$

Matrices are equal thus 4 equations

$$(1) \quad a - 2c = 1 \quad (2) \quad b - 2d = 0$$

$$a = 1 + 2c \quad b = 2d$$

$$(3) \quad 2a - 3c = 3 \quad (4) \quad 2b - 3d = 2$$

Substitute
a from (1) into (3)

b from (2) into (4)

$$2(1 + 2c) - 3c = 3$$

$$2(2d) - 3d = 2$$

$$2 + 4c - 3c = 3$$

$$4d - 3d = 2$$

$$c = 1$$

$$d = 2$$

into (1)

into (2)

$$a = 1 + 2(1)$$

$$b = 2(2)$$

$$= 3$$

$$= 4$$

$$a = 3$$

$$b = 4$$

$$c = 1$$

$$d = 2$$