

Linear AlgebraHomework-1

1-1

$$4. \quad \begin{aligned} x+y &= 5 \\ 3x+3y &= 10 \end{aligned}$$

by elimination,

$$\begin{array}{r} 3x+3y=15 \\ \underline{3x+3y=10} \\ 0=5 \end{array}$$

 $0 = 5 \quad \times \quad \text{NO SOLUTION.}$

1b.

$$\begin{aligned} 3x+4y &= s \quad \times 2 \\ 6x+8y &= t \end{aligned}$$

$$\begin{aligned} 6x+8y &= 2s \\ 6x+8y &= t \end{aligned}$$

a) If $2s = t$, any value like $s = 10$ & $t = 20$

b) If $2s \neq t$.

c) $2s = t$.

1-2

a)	P_1	P_2	P_3	P_4	P_5	b)	P_1	P_2	P_3	P_4	P_5
2.	P_1	0	1	0	0	P_1	0	1	1	1	1
	P_2	1	0	1	1	P_2	1	0	1	0	0
	P_3	0	1	0	0	P_3	1	1	0	1	0
	P_4	0	1	0	0	P_4	1	0	1	0	0
	P_5	1	1	0	0	P_5	1	0	0	0	0

$$8. A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$$

$$(a) A^T = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 3 & 4 \end{bmatrix} \quad (A^T)^T = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$$

$$(b) (C+E)^T = \begin{bmatrix} 3 & -1 & 3 \\ 4 & 1 & 5 \\ 2 & 1 & 3 \end{bmatrix} + \begin{bmatrix} 2 & -4 & 5 \\ 0 & 1 & 4 \\ 3 & 2 & 1 \end{bmatrix}$$

$$C+E = \begin{bmatrix} 5 & -5 & 8 \\ 4 & 2 & 9 \\ 5 & 3 & 4 \end{bmatrix}$$

$$(C+E)^T = \begin{bmatrix} 5 & 4 & 5 \\ -5 & 2 & 3 \\ 8 & 9 & 4 \end{bmatrix}$$

$$C^T + E^T = \begin{bmatrix} 3 & 4 & 2 \\ -1 & 1 & 1 \\ 3 & 5 & 3 \end{bmatrix} + \begin{bmatrix} 2 & 0 & 3 \\ -4 & 1 & 2 \\ 5 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 5 & 4 & 5 \\ -5 & 2 & 3 \\ 8 & 9 & 4 \end{bmatrix}$$

$$(c) (2D+3F)^T = \begin{bmatrix} 6 & -4 \\ 4 & 8 \end{bmatrix} + \begin{bmatrix} -12 & 15 \\ 6 & 9 \end{bmatrix} = \begin{bmatrix} -6 & 11 \\ 10 & 17 \end{bmatrix} = \begin{bmatrix} -6 & 10 \\ 11 & 17 \end{bmatrix}$$

$$(d) D - D^T = \begin{bmatrix} 3 & -2 \\ 2 & 4 \end{bmatrix} - \begin{bmatrix} 3 & 2 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} 0 & -4 \\ 4 & 0 \end{bmatrix}$$

$$(e) \quad 2A^T + B = 2 \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 4 \\ 4 & 2 \\ 6 & 8 \end{bmatrix} + \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 4 \\ 6 & 3 \\ 9 & 10 \end{bmatrix}.$$

$$(f) \quad (3D - 2F)^T = \left[\begin{bmatrix} 9 & -6 \\ 6 & 12 \end{bmatrix} - \begin{bmatrix} -8 & 10 \\ 4 & 6 \end{bmatrix} \right]^T$$

$$= \begin{bmatrix} 17 & -16 \\ 2 & 6 \end{bmatrix}^T$$

$$= \begin{bmatrix} 17 & 2 \\ -16 & 6 \end{bmatrix}.$$

$$10. \quad \begin{bmatrix} 3 & 0 \\ 0 & 2 \end{bmatrix} = 2 \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} + \frac{1}{2} \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$$

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

$$= \begin{bmatrix} 3 & 0 \\ 0 & 2 \end{bmatrix}.$$