AI1110 Assignment 1

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Question 2(a): Find x,y If

$$\begin{pmatrix} -2 & 0 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} -1 \\ 2x \end{pmatrix} + 3 \begin{pmatrix} -2 \\ 1 \end{pmatrix} = 2 \begin{pmatrix} y \\ 3 \end{pmatrix}. \tag{1}$$

Solution:

1) A matrix having m rows and n coloumns is denoted by (m×n) .
2) We can mulitply two matrices if and only if the matrices are in the form (p×q) and (q×r) respectively . [where p,q,r,m,n are arbitrary constants]

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} w & x \\ y & z \end{pmatrix} = \begin{pmatrix} aw + by & ax + bz \\ cw + dy & cx + dz \end{pmatrix} \tag{2}$$

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \pm \begin{pmatrix} w & x \\ y & z \end{pmatrix} = \begin{pmatrix} a \pm w & b \pm x \\ c \pm y & d \pm z \end{pmatrix} \tag{3}$$

$$k \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} ka & kb \\ kc & kd \end{pmatrix} \tag{4}$$

converting the given question into Ax = b form by simplification using equations (2) ,(3) ,(4) ;

$$\begin{pmatrix} 2 \\ 2x - 3 \end{pmatrix} = \begin{pmatrix} 2y \\ 6 \end{pmatrix} - \begin{pmatrix} -6 \\ 3 \end{pmatrix} \tag{5}$$

$$\begin{pmatrix} 2 \\ 2x - 3 \end{pmatrix} = \begin{pmatrix} 2y + 6 \\ 3 \end{pmatrix} \tag{6}$$

$$\begin{pmatrix} 2 \\ 2x - 3 \end{pmatrix} - \begin{pmatrix} 2y + 6 \\ 3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{7}$$

$$\begin{pmatrix} -2y - 4 \\ 2x - 6 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{8}$$

$$\begin{pmatrix} -2y \\ 2x \end{pmatrix} - \begin{pmatrix} 4 \\ 6 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{9}$$

$$\begin{pmatrix} -2y \\ 2x \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} + \begin{pmatrix} 4 \\ 6 \end{pmatrix} \tag{10}$$

$$\begin{pmatrix} -2y \\ 2x \end{pmatrix} = \begin{pmatrix} 4 \\ 6 \end{pmatrix} \tag{11}$$

this can be written as

$$\begin{pmatrix} 0 & -2 \\ 2 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 6 \end{pmatrix} \tag{12}$$

$\therefore$ we got Ax = b form.