Amr Eid mohamed hanafy abd elgawad

group: 5

Subject: session 2 homework. **Date:**

1 Let $x = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$, $y = \begin{bmatrix} 1 \\ 4 \end{bmatrix}$, $\vec{v} = ax + by$

$\vec{v} = \begin{bmatrix} 9 \\ 6 \end{bmatrix}$

$$\begin{bmatrix} 9 \\ 6 \end{bmatrix} = \left[\begin{array}{cc|c} 1 & 1 & 9 \\ 2 & 4 & 6 \end{array}\right]$$

$$R_1 \longrightarrow -4R_1 + R_2$$

$$= \left[\begin{array}{cc|c} -2 & 0 & -30 \\ 2 & 4 & 6 \end{array}\right]$$

$$R_1 \longrightarrow \frac{R_1}{-2}$$

$$R_2 \longrightarrow R_1 + R_2$$

$$= \left[\begin{array}{cc|c} 1 & 0 & 15 \\ 0 & 4 & -24 \end{array}\right]$$

$$R_2 \longrightarrow \frac{R_2}{4}$$

$$= \left[\begin{array}{cc|c} 1 & 0 & 15 \\ 0 & 1 & -6 \end{array}\right] = \begin{bmatrix} a \\ b \end{bmatrix}$$

$(a, b) = (15, -6)$

$V = 15X - 6Y$ ($15\begin{bmatrix} 1 \\ 2 \end{bmatrix} - 6\begin{bmatrix} 1 \\ 4 \end{bmatrix} = \begin{bmatrix} 9 \\ 6 \end{bmatrix}$

Subject: Date:

2 $X_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$ $X_2 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ $X_3 = \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$

$$a\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + b\begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$$

$$\left[\begin{array}{cc|c} 1 & 2 & 2 \\ 2 & 3 & 1 \\ 3 & 1 & 3 \end{array}\right]$$

$R_2 \rightarrow -2R_1 + R_2$

$$\left[\begin{array}{cc|c} 1 & 2 & 2 \\ 0 & -1 & -3 \\ 3 & 1 & 3 \end{array}\right]$$

$R_3 \rightarrow R_3 - R_1$

$$\left[\begin{array}{cc|c} 1 & 2 & 2 \\ 0 & -1 & -3 \\ 0 & -5 & -3 \end{array}\right]$$

$R_2 \rightarrow -R_2$

$R_3 \rightarrow 5R_2 + R_3$

$$\left[\begin{array}{cc|c} 1 & 2 & 2 \\ 0 & 1 & 3 \\ 0 & 0 & 12 \end{array}\right]$$

$R_3 \rightarrow \frac{R_3}{12}$

$$\left[\begin{array}{cc|c} 1 & 2 & 2 \\ 0 & 1 & 3 \\ 0 & 0 & 12 \end{array}\right]$$

equation 3 can't be solved system has no solution

Subject: Date:

3 ⊛ $V_1 = \begin{bmatrix} -2 \\ 3 \end{bmatrix}$ $w = \begin{bmatrix} -8 \\ 12 \end{bmatrix}$

$c \cdot V_1 = w$

$c \cdot \begin{bmatrix} -2 \\ 3 \end{bmatrix} = \begin{bmatrix} -8 \\ 12 \end{bmatrix}$

$c \cdot \begin{bmatrix} -2 \\ 3 \end{bmatrix} = 4 \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ ($c = 4$

$\boxed{w = 4\vec{V}_1}$

⊛ $V_1 = \begin{bmatrix} 2 \\ 0 \\ 5 \end{bmatrix}$ ($V_2 = \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix}$ & $w = \begin{bmatrix} 4 \\ -6 \\ 10 \end{bmatrix}$

$w = a\vec{V}_1 + b\vec{V}_2$

$\begin{bmatrix} a \\ b \end{bmatrix} = \left[\begin{array}{cc|c} 2 & 0 & 4 \\ 0 & 2 & -6 \\ 5 & 0 & 10 \end{array}\right]$

$R_3 \to -3R + R_3$ ($R_1 \to \frac{R_1}{2}$ ($R_2 \to \frac{R_2}{2}$

$\left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & -3 \\ -1 & 0 & -2 \end{array}\right] \longrightarrow \left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & -3 \\ 0 & 0 & 0 \end{array}\right]$

$R_3 \to R_1 + R_3$

Good!! $w = 2\vec{V}_1 - 3\vec{V}_2$

Subject: Date:

4

1	2	3	4	5	6
c	d	b	f	e	a

(1) $v_1 \in \begin{bmatrix} 3 \\ 6 \end{bmatrix} \rightarrow 3 \begin{bmatrix} 1 \\ 2 \end{bmatrix} \rightarrow 3X = Y$

(6) $2 \begin{bmatrix} 1 \\ 3 \end{bmatrix} \longrightarrow X = \frac{1}{2} X$

5 Let $S = \{v_1, v_2, v_3, v_4, v_5\}$

Put Vectors in form of a matrix

$$A = \begin{bmatrix} 1 & 1 & 1 & 1 & 2 \\ 2 & 3 & 5 & 1 & 7 \\ 2 & 1 & -1 & 4 & 0 \\ -1 & 1 & 5 & -1 & 2 \end{bmatrix}$$

$R_2 \rightarrow -2R_1 + R_2$
$R_3 \rightarrow -2R_1 + R_3$
$R_4 \rightarrow R_1 + R_4$

$$\begin{bmatrix} 1 & 1 & 1 & 1 & 2 \\ 0 & 1 & 3 & -1 & 3 \\ 0 & -1 & -3 & 2 & -4 \\ 0 & 2 & 6 & 0 & 4 \end{bmatrix}$$

$R_3 \rightarrow R_1 + R_3$
$R_4 \rightarrow 2R_3 + R_4$

$$\begin{bmatrix} 1 & 1 & 1 & 1 & 2 \\ 0 & 1 & 3 & -1 & 3 \\ 0 & 0 & -2 & 3 & -2 \\ 0 & 0 & 0 & 4 & -4 \end{bmatrix}$$

$R_3 \rightarrow \frac{-1}{2} R_3$
$R_4 \rightarrow \frac{-1}{4} R_4$

Good!

Subject: _____ Date: _____

$$\begin{bmatrix} \textcircled{1} & 1 & 1 & 1 & 2 \\ 0 & \textcircled{1} & 3 & -1 & 3 \\ 0 & 0 & 0 & \textcircled{1} & -1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

↑ ↑ ↑

dimension = 3

basis is : $\{V_1, V_2, V_4\}$

$$\left\{ \begin{bmatrix} 1 \\ 2 \\ 2 \\ -1 \end{bmatrix}, \begin{bmatrix} 1 \\ 3 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 4 \\ 1 \end{bmatrix} \right\}$$