

MATH III - EXAM 2 - SOLUTIONS

(a) $\begin{bmatrix} 3 & 4 & 5 \\ 1 & -2 & 5 \end{bmatrix}$

(b) $\frac{1}{3} \begin{bmatrix} 3 & 4 & 5 \\ 1 & -2 & 5 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & \frac{4}{3} & \frac{5}{3} \\ 1 & -2 & 5 \end{bmatrix}$

$\begin{bmatrix} 1 & \frac{4}{3} & \frac{5}{3} \\ 0 & -\frac{10}{3} & \frac{10}{3} \end{bmatrix} \xrightarrow{-\frac{4}{3}} \begin{bmatrix} 1 & \frac{4}{3} & \frac{5}{3} \\ 0 & 1 & -1 \end{bmatrix}$

$\begin{bmatrix} 1 & 0 & 3 \\ 0 & 1 & -1 \end{bmatrix} \quad \begin{array}{l} x=3 \\ y=-1 // \end{array}$

(c) $\begin{bmatrix} 3 & 4 \\ 1 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 5 \end{bmatrix}$

(d) $\begin{bmatrix} 3 & 4 \\ 1 & -2 \end{bmatrix}^{-1} = \frac{-1}{10} \begin{bmatrix} -2 & -4 \\ -1 & 3 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{1}{5} & \frac{2}{5} \\ \frac{4}{10} & -\frac{3}{10} \end{bmatrix} \begin{bmatrix} 5 \\ 5 \end{bmatrix} = \begin{bmatrix} 3 \\ -1 \end{bmatrix} //$

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$$4. (a) AB = \begin{bmatrix} 250 & 80 & 60 \end{bmatrix} \begin{bmatrix} 40 & 35 \\ 30 & 35 \\ 50 & 75 \end{bmatrix}$$

$$= \begin{bmatrix} 15400 & 16050 \end{bmatrix}$$

AB gives the total revenue from sales of all items in Store 1 and Store 2.

(b) $B - C$ is the difference in number of items sold at each store in the months of August and September

(c) $AB - AC = A(B - C)$ is the difference in revenue at each store between the months of August and September.

$$2. (a) \rightarrow \begin{bmatrix} 1 & -3 & 1 & 5 \\ 0 & 1 & -4 & 1 \\ 1 & -2 & -3 & 6 \end{bmatrix} \xrightarrow{+3} \begin{bmatrix} 1 & -3 & 1 & 5 \\ 0 & 1 & -4 & 1 \\ 0 & 1 & -4 & 1 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 1 & 0 & -11 & 8 \\ 0 & 1 & -4 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad \begin{array}{l} x = 11z + 8 \\ y = 4z + 1 \\ z = \text{any value} \end{array}$$

$$(b) \rightarrow \begin{bmatrix} 1 & 2 & 1 & 3 \\ 1 & 1 & 1 & 3 \\ 2 & 1 & 2 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 2 & 1 & 3 \\ 0 & -1 & 0 & 0 \\ 0 & -3 & 0 & -5 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 1 & 2 & 1 & 3 \\ 0 & 1 & 0 & 0 \\ 0 & -3 & 0 & -5 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 1 & 3 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & -5 \end{bmatrix}$$

no solution

$$3. (a) BA = \begin{bmatrix} 3 & -1 \\ 2 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & -1 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 2 & -8 \\ 4 & -2 \\ 4 & 5 \end{bmatrix}$$

(b) CB is not defined

$$(c) A + C = \begin{bmatrix} 2 & -1 \\ 4 & 5 \end{bmatrix} + \begin{bmatrix} 1 & 6 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 3 & 5 \\ 6 & 8 \end{bmatrix} //$$