

Q1:

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Quiz 7

$$\begin{bmatrix} 1 & 3 & -1 & 4 \\ 2 & 4 & 0 & 2 \\ -4 & -8 & 0 & h \end{bmatrix} \xrightarrow[\frac{R_3}{-4}]{\frac{1}{2}R_2} \begin{bmatrix} 1 & 3 & -1 & 4 \\ 1 & 2 & 0 & 1 \\ 1 & 2 & 0 & -\frac{h}{4} \end{bmatrix}$$

$$\xrightarrow[\substack{R_2 - R_3 \\ = nR_3}]{\substack{R_1 - R_2 \\ = nR_2}} \begin{bmatrix} 1 & 3 & -1 & 4 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & \frac{h}{4} + 1 \end{bmatrix}$$

$$\xrightarrow{R_1 - 3R_2 = nR_1} \begin{bmatrix} 1 & 0 & 2 & -5 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & \frac{h}{4} + 1 \end{bmatrix}$$

To let \vec{y} will be in the subspace spanned by $\vec{u}_1, \vec{u}_2, \vec{u}_3$

$$\Rightarrow \frac{h}{4} + 1 = 0 \Rightarrow \boxed{h = -4}$$

Q2: a)

$$A = \begin{bmatrix} 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & -1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 \end{bmatrix} \xrightarrow[\substack{R_1 - R_2 = nR_1 \\ R_1 - R_3 = nR_3}]{\substack{R_1 - R_2 = nR_1 \\ R_1 - R_3 = nR_3}} \begin{bmatrix} 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & -1 & 0 & 0 \\ 0 & 1 & 0 & -1 & 0 \end{bmatrix}$$

$$\xrightarrow[\substack{-R_2 + R_3 \\ = nR_3}]{\substack{-R_2 + R_3 \\ = nR_3}} \begin{bmatrix} 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & -1 & 0 \end{bmatrix} \xrightarrow[\substack{R_1 - R_3 \\ = nR_1 \\ R_2 + R_3 \\ = nR_3}]{\substack{R_1 - R_3 \\ = nR_1 \\ R_2 + R_3 \\ = nR_3}} \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & -1 & 0 \end{bmatrix}$$

$$\begin{cases} x_1 = -x_4 \\ x_2 = x_4 \\ x_3 = x_4 \\ x_4 \text{ is free} \end{cases} \Rightarrow \vec{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = x_4 \begin{bmatrix} -1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

$$\Rightarrow \text{Null Space of } T = \begin{bmatrix} -1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

(d) Column space of T:

$$\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

(c)

$$\vec{x} = x_4 \begin{bmatrix} -1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

(b)

$$\left\{ \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \right\}$$

I am sorry that I did not type in
Blackboard on time.