

Ch 5 Review Questions:

$$C = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 5 & 4 \\ 2 & 4 & 6 & 8 \end{bmatrix} \xrightarrow{R_2 - R_1 \rightarrow R_2, R_3 - 2R_1 \rightarrow R_3} \begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 2 & 2 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} = D$$

- 0.) Does $C\mathbf{x} = \mathbf{b}$ have at most one solution for all \mathbf{b} ?
- 1.) Does $C\mathbf{x} = \mathbf{0}$ have exactly one solution?
- 2.) In an echelon form of C , is there a leading entry in every COLUMN?
- 3.) Is $\mathbf{0}$ the only solution to $C\mathbf{x} = \mathbf{0}$?
- 4.) Are the columns of C linearly independent?
- 5.) Are none of the columns of C a linear comb'n of the other columns of C ?
- 6.) Are none of the columns of C in the span of the other columns of C ?

$$C = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 5 & 4 \\ 2 & 4 & 6 & 8 \end{bmatrix} \xrightarrow{R_2 - R_1 \rightarrow R_2, R_3 - 2R_1 \rightarrow R_3} \begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 2 & 2 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} = D$$

- 0.) Does $C\mathbf{x} = \mathbf{b}$ have more than one solution for some \mathbf{b} ?
 - 1.) Does $C\mathbf{x} = \mathbf{0}$ have an infinite number of solutions?
 - 2.) Are there free variables in the solution to $C\mathbf{x} = \mathbf{0}$?
 - 3.) Does $C\mathbf{x} = \mathbf{0}$ have a non-zero solution?
 - 4.) Are the columns of C linearly dependent?
 - 5.) Is one of the columns of C a linear comb'n of the other columns of C ?
 - 6.) Is one of the columns of C in the span of the other columns of C ?
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If possible, write one of the columns of C as a linear combination of the other columns of C :

$$C = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 5 & 4 \\ 2 & 4 & 6 & 8 \end{bmatrix} \xrightarrow{R_2 - R_1 \rightarrow R_2, R_3 - 2R_1 \rightarrow R_3} \begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 2 & 2 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} = D$$

- 1.) Does $C\mathbf{x} = \mathbf{b}$ have at least one solution for all \mathbf{b} ?
 - 2.) Does $C\mathbf{x} = \mathbf{b}$ have a solution for all \mathbf{b} ?
 - 3.) In an echelon form of C , are there NO rows of all zeros?
 - 4.) In an echelon form of C , is there a leading entry in every ROW?
 - 5.) Can any vector in R^- be written as a linear comb'n of the columns of C ?
 - 6.) Do the columns of C span R^- ?
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1b.) Find a solution to the equation $C\mathbf{x} = \begin{bmatrix} 3 \\ 7 \\ 6 \end{bmatrix}$.

2b.) Write $\begin{bmatrix} 3 \\ 7 \\ 6 \end{bmatrix}$ as a linear combination of the columns of C .

3b.) Write $3 + 7t + 6t^2$ as a linear combination of $\{1 + t + 2t^2, 2 + 4t + 4t^2, 3 + 5t + 6t^2, 4 + 4t + 4t^3\}$.

1a.) Does $C\mathbf{x} = \begin{bmatrix} 4 \\ 2 \\ 0 \end{bmatrix}$ have at least one solution?

1b.) Does $C\mathbf{x} = \begin{bmatrix} 3 \\ 7 \\ 6 \end{bmatrix}$ have at least one solution?

2a.) Is $\begin{bmatrix} 4 \\ 2 \\ 0 \end{bmatrix}$ a linear combination of the columns of C :

2b.) Is $\begin{bmatrix} 3 \\ 7 \\ 6 \end{bmatrix}$ a linear combination of the columns of C :

3a.) Is $4 + 2t$ a linear combination of $\{1 + t + 2t^2, 2 + 4t + 4t^2, 3 + 5t + 6t^2, 4 + 4t + 4t^3\}$?

3b.) Is $3 + 7t + 6t^2$ a linear combination of $\{1 + t + 2t^2, 2 + 4t + 4t^2, 3 + 5t + 6t^2, 4 + 4t + 4t^3\}$?

$$C = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 5 & 4 \\ 2 & 4 & 6 & 8 \end{bmatrix} \xrightarrow{R_2 - R_1 \rightarrow R_2, R_3 - 2R_1 \rightarrow R_3} \begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 2 & 2 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} = D$$