CS724 Assignment 1 : Question 1

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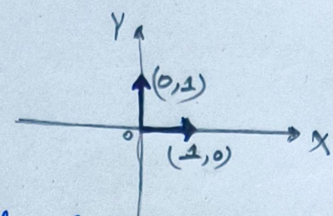
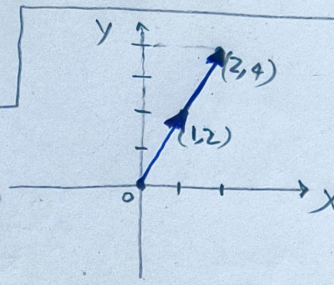
1) Given $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$



The given column vectors are linearly independent. So the weighted combination of these will cover the whole 2D space

i.e $C(A) = \mathbb{R}^2$

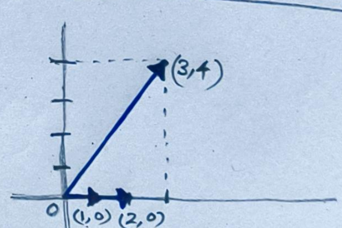


2) Given $B = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$

The given column vectors are linearly dependent as $\begin{bmatrix} 2 \\ 4 \end{bmatrix}$ is achievable from $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$. So any weighted combination of these will only manage to be along these vectors' straight line

$\therefore$ $C(B) = R^1$

3) Given $D = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 4 \end{bmatrix}$



Two column vectors $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} 2 \\ 0 \end{bmatrix}$ are linearly dependent, so they will only manage to be in 1D space. But the third vector is independent to the other vectors. So any weighted combination of these can cover the 2D space.

$\therefore$ $C(D) = \mathbb{R}^2$