

## Step-1

Suppose the 9 by 12 system  $Ax = b$  is solvable for every  $b$ .

We have to find  $\mathbf{C}(A)$ .

## Step-2

Column  $A = \{b \mid b = Ax \text{ for some } x \text{ in } \mathbf{R}^n\}$ , where  $A$  is  $m$  by  $n$  matrix

The column space of an  $m \times n$  matrix  $A$  is the set of all linear combinations of columns of  $A$  and the column space of an  $m \times n$  matrix  $A$  is a subspace of  $\mathbf{R}^m$

Since given system is 9 by 12 system and  $Ax = b$  is solvable for every  $b$ .

And also the column space of the 9 by 12 matrix  $A$  is the subspace of  $\mathbf{R}^9$

Therefore  $\boxed{\mathbf{C}(A) = \mathbf{R}^9}$