(1) For each matrix A below, its columns will be labelled $\mathbf{a}_i$.

- Use R to write the columns of A as linear combinations of each other or state that this is not possible.
- Find a *basis* for $C(A)$, the column space of A and $N(A)$, the null space of A.
- Determine the *dimensions* of $C(A)$ and $N(A)$.

(a) $A \quad \rightarrow \quad R = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 3 \\ 0 & 0 & 0 \end{bmatrix}$

(b) $A \quad \rightarrow \quad R = \begin{bmatrix} 1 & 0 & 2 & 0 & 0 \\ 0 & 1 & 0 & 0 & 3 \\ 0 & 0 & 0 & 1 & -4 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

(c) $A \quad \rightarrow \quad R = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(2) (summary of previous page) Suppose A is an $m \times n$ matrix of rank r.

(a) The dimension of $C(A)$ is ________ and a basis for $C(A)$ can be found by

(b) The dimension of $N(A)$ is ________ and a basis for $N(A)$ can be found by

(3) Find a basis for the *row space of* A where $A = \begin{bmatrix} 1 & 0 & 2 \\ 1 & 1 & 5 \\ 2 & -2 & -2 \end{bmatrix}$.

Revisit 1b.