Exercise 1

Find bases and dimensions for the row, column and null spaces of the matrix:

(i) \[
\begin{pmatrix}
1 & 2 & 0 \\
-1 & -1 & 1
\end{pmatrix};
\]

(ii) \[
\begin{pmatrix}
1 & 2 \\
-3 & -6 \\
4 & 8
\end{pmatrix}.
\]

Exercise 2

Find the rank and the nullity of the matrix:

(i) \[
\begin{pmatrix}
2 & 2 & -2 \\
-3 & -3 & 3
\end{pmatrix};
\]

(ii) \[
\begin{pmatrix}
4 & -3 & -3 \\
2 & 1 & 1 \\
5 & 0 & 0
\end{pmatrix}.
\]

Exercise 3

Find a subset of the vectors that forms a basis of their span:

(i) \( \mathbf{v}_1 = (1, -1, 1), \mathbf{v}_2 = (-2, 2, -2) \);

(ii) \( \mathbf{v}_1 = (2, -1), \mathbf{v}_2 = (1, 2), \mathbf{v}_3 = (1, 1) \).