Exercise 1

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

(i) \[
\begin{pmatrix}
1 & 4 & 0 \\
-1 & -2 & 1
\end{pmatrix};
\]

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

Exercise 2

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

(i) \(u_1 = (1, -1, 1), \ u_2 = (-3, 3, -3)\).

(ii) \(u_1 = (2, -1, 1), \ u_2 = (1, 1, 1), \ u_3 = (0, -3, -1)\).

Exercise 3

Find the rank and the nullity of the matrix:

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

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