Example

Determine the relative position of the straight line $\boldsymbol{l}: (x, y, z) = (2, -1, 0) + k(1,\ 2, 1)$ and the plane $\boldsymbol{p}: (x, y, z) = (5, 0, 0) + t(3, 0, 1) + s(4, -1, 1)$

Solution

We start by considering the matrix which columns are the components of the three director vectors (2 of the plane and 1 of the straight line) and we find its rank.

The coefficient matrix

$$\begin{bmatrix} 1 & 3 & 4 \\ 2 & 0 & -1 \\ 1 & 1 & 1 \end{bmatrix}$$

System is inconsistent, and the rank of the coefficient matrix equals 2, then the plane and the line are parallel.