Problem Statement:
To verify whether the lines passing through the given set of points are parallel or not

Solution
Let the lines be parallel and the first two points pass through $n^T x = c1$ i.e.

$$n^T x_1 = c_1 => x_1^T n = c_1, \quad n^T x_2 = c_2 => x_2^T n = c_2 \tag{1}$$

and the second two points pass through $n^T x = c2$ Then

$$n^T x_3 = c_3 => x_3^T n = c_3, \quad n^T x_4 = c_4 => x_4^T n = c_4 \tag{2}$$

Putting equations (1) and (2) together, we obtain

$$\begin{pmatrix} x_1^T \\ x_2^T \\ x_3^T \\ x_4^T \end{pmatrix} \vec{n} = \begin{pmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \end{pmatrix} \tag{3}$$

Now if this equation has a solution, then $\vec{n}$ exists and the lines will be parallel.