

### Question 1.3.2

Find the equation of  $AD_1$

**Solution:** Since  $AD_1$  is a altitude, the normal vector to it will be

$$\mathbf{n} = \mathbf{B} - \mathbf{C} \quad (1)$$

$$= \begin{pmatrix} -4 \\ 6 \end{pmatrix} - \begin{pmatrix} -3 \\ -5 \end{pmatrix} \quad (2)$$

$$= \begin{pmatrix} -1 \\ 11 \end{pmatrix} \quad (3)$$

The normal equation of  $AD_1$  will be

$$\mathbf{n}^T \mathbf{x} = \mathbf{n}^T \mathbf{A} \quad (4)$$

$$\Rightarrow \begin{pmatrix} -1 & 11 \end{pmatrix} \mathbf{x} = \begin{pmatrix} -1 & 11 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (5)$$

Hence, we get the line

$$AD_1 : \begin{pmatrix} -1 & 11 \end{pmatrix} \mathbf{x} = -12 \quad (6)$$

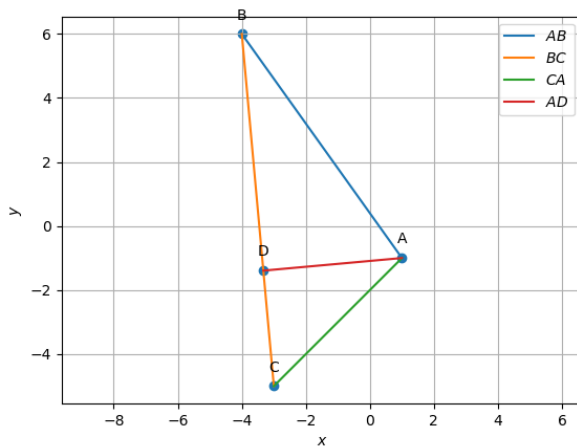


Fig. 1. Altitude plotted using python