Question 1.3.3
Find the equations of the altitudes BE_1 and CF_1 to the sides AC and AB respectively.

Solution:

1) To find line BE_1:

$$\text{The slope of } CA = \begin{pmatrix} 4 \\ 4 \end{pmatrix} \tag{1}$$

$$\text{The slope of } BE_1 = \begin{pmatrix} 4 \\ -4 \end{pmatrix} \tag{2}$$

$$n^\top \text{ of } BE_1 = \begin{pmatrix} 4 \\ 4 \end{pmatrix} \tag{3}$$

Hence, we get the line

$$BE_1 : \begin{pmatrix} 4 & 4 \end{pmatrix} \mathbf{x} = 8 \tag{4}$$

2) To find line CF_1:

$$\text{The slope of } AB = \begin{pmatrix} -5 \\ 7 \end{pmatrix} \tag{5}$$

$$\text{The slope of } CF_1 = \begin{pmatrix} 7 \\ 5 \end{pmatrix} \tag{6}$$

$$n^\top \text{ of } CF_1 = \begin{pmatrix} -5 \\ 7 \end{pmatrix} \tag{7}$$

Hence, we get the line

$$CF_1 : \begin{pmatrix} -5 & 7 \end{pmatrix} \mathbf{x} = -20 \tag{8}$$

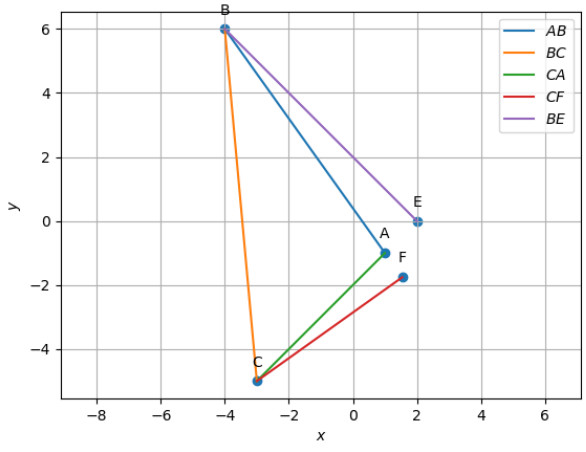

Fig. 1. Altitudes BE and CF plotted using python