Assignment 1

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Download the python code from

https://github.com/jvinaykumar12/matrix_theory_ee5609/tree/master/Assignment1

and latex-file codes from

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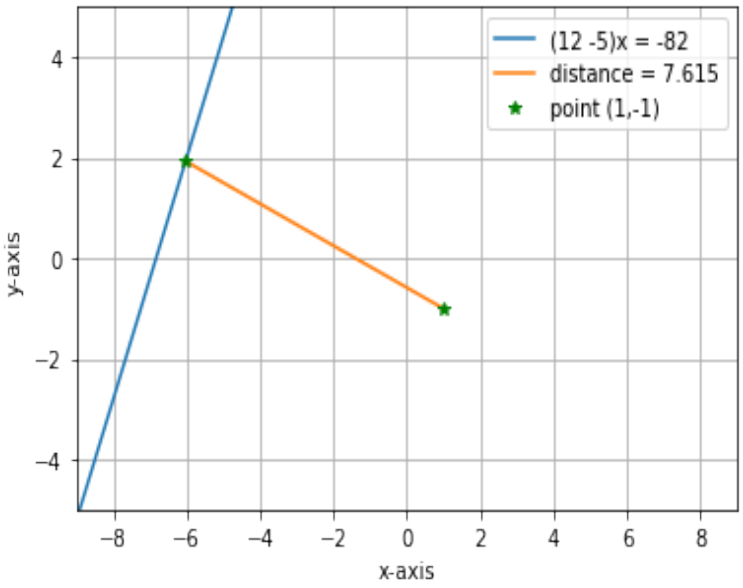

1 Question No.33

Find the distance of the point $\begin{pmatrix}1\\-1\end{pmatrix}$ from the line $\begin{pmatrix}12 & -5\end{pmatrix}\mathbf{x} = -82$

2 Explanation

First we find the normal vector to the given line and then using the normal vector we can find out the line which is perpendicular to the given line and passes through the point $\begin{pmatrix}1 & -1\end{pmatrix}$.The distance from the point to the line is the distance between point of intersection of two lines and the given point

The normal to the given line is

$$\mathbf{n} = \begin{pmatrix}5 & 12\end{pmatrix} \tag{2.0.1}$$

The equation of the line perpendicular to the given line is

$$\begin{pmatrix}5 & 12\end{pmatrix}\mathbf{x} = -7 \tag{2.0.2}$$

The above two line equations in matrix form

$$\begin{pmatrix}12 & -5\\5 & 12\end{pmatrix}\mathbf{x} = \begin{pmatrix}-82\\-7\end{pmatrix} \tag{2.0.3}$$

The solution to the above matrix is the point of intersection of the two lines

$$\mathbf{x} = \begin{pmatrix}12 & -5\\5 & 12\end{pmatrix}^{-1}\begin{pmatrix}-82\\-7\end{pmatrix} \tag{2.0.4}$$

The point of intersection is (-6.0295 , 1.9289) the distance between the line and point is 7.6153