

## ASSIGNMENT- MATRICES

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### Problem:

Find the coordinates of the foot of perpendicular from the point  $(-1,3)$  to the line  $3x - 4y - 16 = 0$ .

### solution:

Let the given line equation be a normal vector to a plane where the given point  $P(-1,3)$  lies. The intersection of the plane and line equations gives the coordinates of foot of the perpendicular from point  $p$ .

The parametric equation of a line is given by

$$x = A + \lambda m \quad (1)$$

The equation of the line perpendicular to normal of a plane and passing through the point  $\vec{P}$  is given by

$$m^\top (x - P) = 0 \quad (2)$$

Solving both the equations gives us the intersection point 'Q'.

$$Q = A + \frac{m^\top (P - A)}{m^\top m} m \quad (3)$$

Further solving the equation with

$A = \begin{pmatrix} 0 \\ -4 \end{pmatrix}, P = \begin{pmatrix} -1 \\ 3 \end{pmatrix}, m = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$  gives us the foot of the perpendicular

$$Q = \begin{pmatrix} 2.72 \\ -1.96 \end{pmatrix} \quad (4)$$

<https://github.com/reshma0639/FWC-Assignment-1/blob/main/avrgcc/codes/main.c>

4. Now by taking different combination of inputs, check the output being 0 or 1 in regard with the LED off and on respectively.