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FWC22084

ASSIGNMENT- MATRICES

Abstract:

This manual explains the foot of the perpendicular from a point to the given line using matrices.

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

$$x = A + \lambda m \tag{1}$$

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

$$m^\top (x - P) = 0 \tag{2}$$

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

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

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

$$Q = \begin{pmatrix} 2.72 \\ -1.96 \end{pmatrix} \tag{4}$$

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.

Table 1: Truth table

5. Cross check the output with the above mentioned truth table for the corresponding input combination(X,Y,Z).

$$FN = (X + Y')(Y' + Z)(X' + Y + Z')$$