Answer on Question #55094 – Math – Analytic Geometry

Suppose the point P=(1,2) lies on line L. Suppose that the angle between the line and the vector N = <3,4> is 90° (whenever this happens we say vector N is normal to the line). Let Q = (x,y) be another point on the line L. Use the fact that N is orthogonal to PQ to obtain an equation of the line L.

Solution

Vector $\overrightarrow{PQ} =< x - x_0, y - y_0 >=< x - 1, y - 2 >$ lies on the line L.

If $\vec{N}$ is orthogonal to $\overrightarrow{PQ}$, then the general form of an equation of the line L is the following:

$$n1(x-x_0)+n2(y-y_0)=0,$$

where $\vec{N} =< \mathrm{n1}, \mathrm{n2} >$ is a normal vector and P(x_0,y_0) is a point, which lies on the line L.

So in this case we have $\vec{N} =< 3,4 >$ and P(1,2), that is, n1=3, n2=4, x_0=1, y_0=2.

After substitution we shall obtain

3(x-1)+4(y-2)=0 => 3x-3+4y-8=0 => 3x+4y-11=0.

Answer: 3x+4y-11=0.