Answer on Question #46169 – Math - Analytic Geometry

Problem.

(a) Find the equation of the line which passes through (1,under-root3) and makes an angle 30^0 with the line x - under-root3*y + under-root3 =0.

(b) Find the distance of the line obtained in part (a), from the origin by expressing it in the normal form. Also find the intercepts made by this line on the coordinate axes.

Solution.

(a) The line $x-\sqrt{3}y+\sqrt{3}=0$ $\left(y=\frac{1}{\sqrt{3}}x+1\right)$ has slope $\frac{1}{\sqrt{3}}=\tan 30^\circ$, so the slope of the line which makes an angle 30° with this line is equal to $\tan 0^\circ=0$ or $\tan 30^\circ=0$. Then the new line has equation $y=\sqrt{3}$ or $y=\sqrt{3}(x-1)+\sqrt{3}=\sqrt{3}x$ (as they both pass through point $(1,\sqrt{3})$).

Answer: $y=\sqrt{3}$ or $y=\sqrt{3}x$.

(b) The normal equations of lines $y=\sqrt{3}$ and $y=\sqrt{3}x$ are $y-\sqrt{3}=0$ and $\frac{1}{2}y-\frac{\sqrt{3}}{2}x=0$. Therefore the distances to the origin are equal to $\sqrt{3}$ and 0 respectively. The line $y=\sqrt{3}x$ passes through the origin.

The line $y=\sqrt{3}$ intersect Oy at $(0,\sqrt{3})$ and doesn't intersect Ox.

The line $y=\sqrt{3}x$ intersect Ox and Oy at $(0,0)$.