

Answer on Question #58512 – Math – Analytic Geometry

Question

Find the equation of the line which is twice as far from the line $4x+3y-6=0$ as from $4x+3y-5=0$

Solution

Assume line 1: $4x + 3y - 6 = 0$, line 2: $4x + 3y - 5 = 0$.

All three lines should be parallel, so equation of the line have the following form:

$$4x + 3y - d = 0.$$

Distance to line 1:

$$d_1 = \frac{|6 - d|}{\sqrt{4^2 + 3^2}} = \frac{|6 - d|}{5}$$

Distance to line 2:

$$d_2 = \frac{|5 - d|}{\sqrt{4^2 + 3^2}} = \frac{|5 - d|}{5}$$

We should find the line that satisfies the equality

$$d_1 = 2d_2$$

Substitute for d_1 and d_2 :

$$\frac{|6 - d|}{5} = 2 \frac{|5 - d|}{5}$$

$$|6 - d| = 2|5 - d|$$

Solving this equation obtain solutions:

$$\begin{cases} d = \frac{16}{3} \\ d = 4 \end{cases}$$

Answer: Two possible solutions are $4x + 3y - 4 = 0$ or $4x + 3y - \frac{16}{3} = 0$.

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