Answer on Question #57670 - Math - Analytic Geometry

1. *Find the general equation of the line passing through the given point and parallel to the indicated equation of the line:*
a. (4, 1); 3X + 4Y - 10 = 0
b. (-1/2, -4); 7x - 8y - 5 = 0
Solution:
a. (4, 1); 3X + 4Y - 10 = 0
The general equation is Ax+By+C=0. If lines are parallel we can use A=3, B=4.

$$3x + 4y + C = 0$$

If line passes through the given point that the coordinates of point correlate with general equation:
$3 \cdot 4 + 4 \cdot 1 + C = 0 \ \rightarrow C = -16.$
The general equation is 3x+4y-16=0.

b. (-1/2, -4); 7x - 8y - 5 = 0
We solve in the same way.

$$7x - 8y + C = 0 \rightarrow 7 \cdot \left(-\frac{1}{2}\right) - 8 \cdot (-4) + C = 0 \ \rightarrow C = -28.5$$

The general equation is $\boldsymbol{7x - 8y - 28.5 = 0}$

2. Find the general equation of the line passing through the given point and perpendicular to the indicated equation of the line
a. (, 4); 4x + 4y - 11 = 0
b. (-4, -1/3); 7x - 8y -5 = 0
Solution:
The Slope-Intercept Form of the equation of a straight line is y=mx+b.
If line1 and line2 are perpendicular then $m_1 \cdot m_2 = -1$
a. (, 4); 4x + 4y - 11 = 0
Line1: $4x + 4y - 11 = 0 \rightarrow 4y = 11 - 4x \rightarrow y = -x + \frac{11}{4}$

$$m_1 = -1 \rightarrow m_2 = 1$$

Line 2: $y = x + b$.
We have a point of line2 (0,4): $4 = 0 + b$, $b = 4$

$$y = x + 4$$

The general equation is $\boldsymbol{x - y + 4 = 0}$
b. (-4, -1/3); 7x - 8y -5 = 0
Line1: $7x - 8y - 5 = 0 \rightarrow 8y = 7x - 5 \rightarrow y = \frac{7}{8}x - \frac{5}{8}$

$$m_1 = \frac{7}{8} \rightarrow m_2 = -\frac{8}{7}$$

Line 2: $y = -\frac{8}{7} + b$.
We have a point of line2 (*-4, -1/3)*: $-\frac{1}{3} = -\frac{8}{7} \cdot (-4) + b$, $b = \frac{89}{21}$

$$y = -\frac{8}{7}x + \frac{89}{21} \rightarrow y + \frac{8}{7}x - \frac{89}{21} = 0 \rightarrow 24x + 21y - 89 = 0$$

The general equation is $\boldsymbol{24x + 21y - 89 = 0}$

Find the angle of inclination of a line whose equation is
a. 6x - 5y + 30 = 0
b. 3x - 5y + 6 = 0
c. 12x - 9y = 32
Solution:
The Slope-Intercept Form of the equation of a straight line is y=mx+b.

$$m = tan\theta$$

a. 6x - 5y + 30 = 0

$$6x - 5y + 30 = 0 \rightarrow y = \frac{6}{5}x + 6 \rightarrow y = 1.2x + 6$$

$$tan\theta = 1.2$$

$$\boldsymbol{\theta \approx 50^\circ}$$

b. 3x - 5y + 6 = 0

$$3x - 5y + 6 = 0 \rightarrow y = \frac{3}{5}x + \frac{6}{5} \rightarrow y = 0.6x + \frac{6}{5}$$

$$tan\theta = 0.6$$

$$\boldsymbol{\theta \approx 31^\circ}$$

c. 12x - 9y = 32

$$12x - 9y = 32 \rightarrow y = \frac{12}{9}x - \frac{32}{9} \rightarrow y = \frac{4}{3}x - \frac{32}{9}$$

$$tan\theta \approx 1.3333$$

$$\boldsymbol{\theta \approx 53.1^\circ}$$