Name: *Caleb McWhorter — Solutions*
MATH 101
Fall 2022
HW 14: Due 11/07

"If you want to have good ideas, you must have many ideas."

$-$ *Linus Pauling*

Problem 1. (10pt) Showing all your work and explaining your reasoning, answer the following:

(a) Find the equation of the line through $(-5, 9)$ with slope $-\frac{3}{5}$.

(b) Find the equation of the line through $(0, -4)$ and $(-6, -11)$.

Solution.

(a) Because the line is not vertical, we know that it has the form $y = mx + b$ for some m, b. Because the slope is $-\frac{3}{5}$, we know that $m = -\frac{3}{5}$. But then $y = -\frac{3}{5}x + b$. But as $(-5, 9)$ is on the line, we know...

$$y = -\frac{3}{5}x + b$$

$$9 = -\frac{3}{5} \cdot -5 + b$$

$$9 = 3 + b$$

$$b = 6$$

Therefore, the equation of the line is $y = -\frac{3}{5}x + 6$.

(b) Because the line is not vertical, we know that it has the form $y = mx + b$ for some m, b. We know that the slope is...

$$m = \frac{\Delta y}{\Delta x} = \frac{-11 - (-4)}{-6 - 0} = \frac{-7}{-6} = \frac{7}{6}$$

Therefore, $m = \frac{7}{6}$. Then $y = \frac{7}{6}x + b$. Because the line contains the point $(0, -4)$, we have...

$$y = \frac{7}{6}x + b$$

$$-4 = \frac{7}{6} \cdot 0 + b$$

$$b = -4$$

Therefore, the equation of the line is $y = \frac{7}{6}x - 4$.

Problem 2. (10pt) Find the equation of the line with x-intercept -7 and y-intercept 3.

Solution. Because the line is not vertical, the line has the form $y = mx + b$. If the x-intercept of the line is -7, then the line contains the point $(-7, 0)$. If the y-intercept of the line is 3, the line contains the point $(0, 3)$. The slope is...

$$m = \frac{\Delta y}{\Delta x} = \frac{0 - 3}{-7 - 0} = \frac{-3}{-7} = \frac{3}{7}$$

Therefore, $y = \frac{3}{7}x + b$. Because the line contains the point $(0, 3)$, we have $3 = \frac{3}{7} \cdot 0 + b$ so that $b = 3$. Therefore, the equation of the line is $y = \frac{3}{7}x + 3$.