$(x+2)(x-3) = x^2 - x - 6$ set $= 0$

$D = b^2 - 4ac = (-1)^2 - 4(1)(-6) = 1 + 24 = 25$

$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{-(-1) \pm \sqrt{25}}{2(1)} = \frac{1 \pm 5}{2}$ → $\frac{6}{2} = 3$, $\frac{-4}{2} = -2$

$(x+3)(x-2)$ Newp

$x = 3 \leftrightarrow (x-3)$ is a factor

$x = -2 \leftrightarrow (x-(-2))$ .. .. ..

MORE from TEST 1:

#10 $x^2 + 6x - 7 = 0$

$x^2 + 6x + 3^2 = 7 + 9$

$(x+3)^2 = 16$

$x + 3 = \pm\sqrt{16} = \pm 4$

$x = -3 \pm 4$ → 1, -7

$x \in \{1, -7\}$

$(x+7)(x-1)$

$= x^2 - x + 7x - 7$

$= x^2 + 6x - 7$

#11 $7x^2 - 6x - 9$

#11

$7x^2 - 6x - 9 = 0$

$x^2 - \frac{6}{7}x - \frac{9}{7} = 0$

$x^2 - \frac{6}{7}x + \left(\frac{3}{7}\right)^2 = \frac{9}{7} + \frac{9}{49}$

$\frac{\cancel{6}^{3}}{7} \cdot \frac{1}{\cancel{2}_{1}} = \frac{3}{7} \rightsquigarrow \left(\frac{3}{7}\right)^2 = \frac{3^2}{7^2} = \frac{9}{49}$

SCRATCH

$\frac{1}{7} \cdot \frac{7}{7} + \frac{9}{49}$

$= \frac{63+9}{49} = \frac{72}{49}$

$\left(x - \frac{3}{7}\right)^2 = \frac{72}{49}$

$x - \frac{3}{7} = \pm\sqrt{\frac{72}{49}} = \pm\frac{\sqrt{72}}{7} = \pm\frac{6\sqrt{2}}{7}$

$x = \frac{3}{7} \pm \frac{6\sqrt{2}}{7}$ OR $\frac{3 \pm 6\sqrt{2}}{7}$

SCRATCH:

$72 = 2 \cdot 36$

$36 = 2 \cdot 18$

$18 = 3 \cdot 6$

$6 = 2 \cdot 3$

$\sqrt{72} = 2 \cdot 3\sqrt{2}$

12. Find an equation in point-slope form through the point $(-13, 77)$ of the line that is…

a. (5 pts) … parallel to $y = -5x + 13$

b. (5 pts) … perpendicular to $y = -5x + 13$

(a) $m_{\parallel} = m = -5$

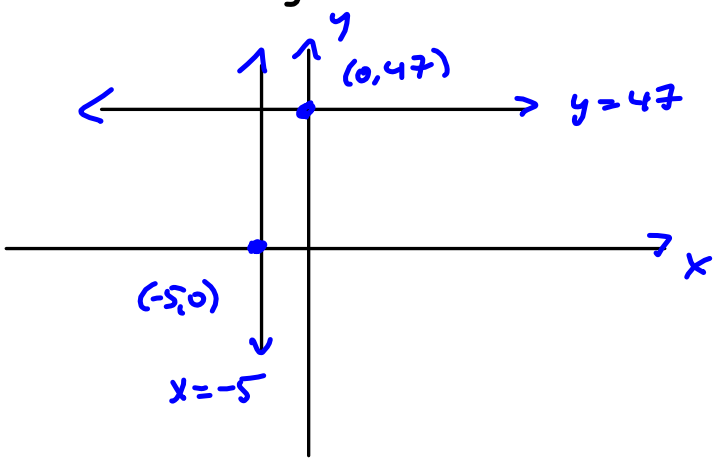
$y = m(x - x_1) + y_1$

$y = -5(x - (-13)) + 77$

(b) $m_{\perp} = -\frac{1}{m} = -\frac{1}{-5} = \frac{1}{5}$

$y = \frac{1}{5}(x + 13) + 77$

(14) $x = -5$, $y = 47$ on same axes.

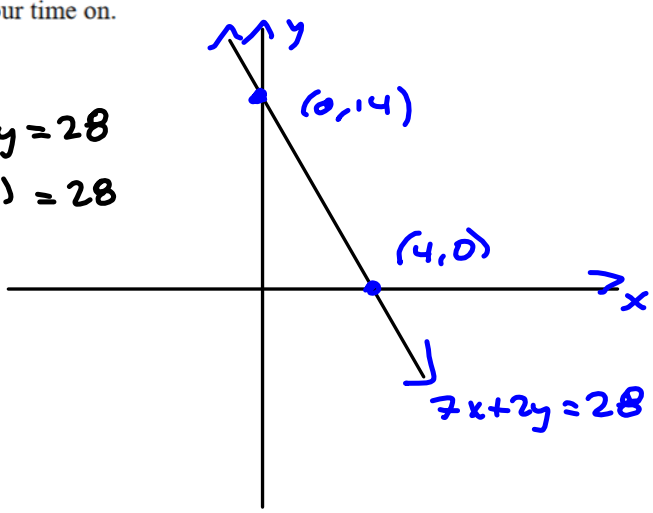


14. Sketch the graph of $7x + 2y = 28$. I'll know if you've been paying attention by the features you include and the features you don't waste our time on.

x	y
0	14
4	0

$7(0) + 2y = 28$

$7x + 2(0) = 28$



15 a $|8x-3| > 5$

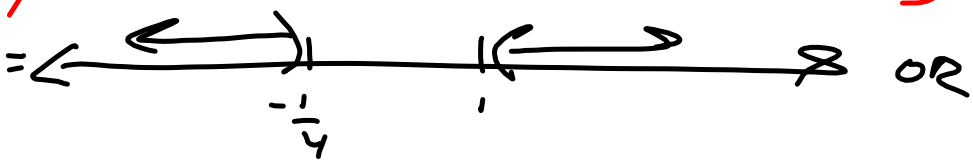
$8x-3 > 5$ OR $8x-3 < -5$

$+3 = +3$ $+3 = +3$

$8x > 8$ $8x < -2$

$\frac{8x}{8} > \frac{8}{8}$ $\frac{8x}{8} < \frac{-2}{8}$

$\{x \mid x > \frac{8}{8} = 1$ OR $x < \frac{-2}{8} = -\frac{1}{4}\}$



$= (-\infty, -\frac{1}{4}) \cup (1, \infty)$

$|7x-9|$

$|-7x+9| = |(-1)(7x-9)|$

$= |-1||7x-9| = |7x-9|$

$|\ <$ AND

$|\ >$ OR

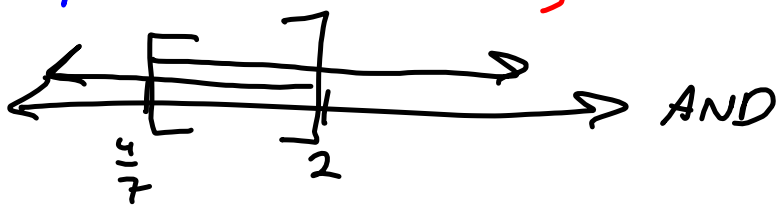
(b) $|-7x+9| \le 5$

$-7x+9 \le 5$ AND $-7x+9 \ge -5$

$-7x \le -4$ $\quad -7x \ge -14$

$\frac{-7x}{-7} \ge \frac{-4}{-7} = \frac{4}{7}$ $\quad x \le \frac{-14}{-7} = 2$

$\{x \mid x \ge \frac{4}{7}$ AND $x \le 2\}$

$=$ 

$= [\frac{4}{7}, 2]$

(c) $|2x+7|+9<5$

$-9=-9$

$|2x+7|<-4$

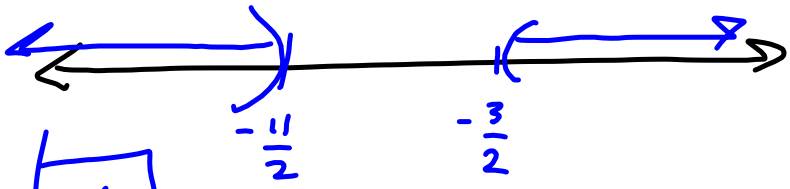
unpossible

No! $\boxed{\varnothing}$

$2x+7<-4$ AND $2x+7>4$

$2x<-11$ $\quad 2x>-3$

$\{x \mid x<-\frac{11}{2}$ and $x>-\frac{3}{2}\}$

$=$  AND

$=\boxed{\varnothing}$

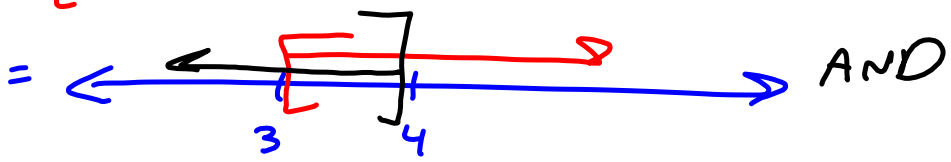
$|2x-7|+2 \leq 3$

$|2x-7| \leq 1$

$2x-7 \leq 1$ AND $2x-7 \geq -1$

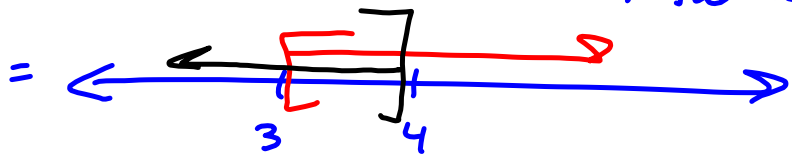
$2x \leq 8$ $2x \geq 6$

$\{x \mid x \leq 4$ AND $x \geq 3\}$



$= [3, 4]$

Analyze: This is why AND & OR matter! The interpretation!



$= (-\infty, \infty)$!

16. (5 pts) SET UP THE FOLLOWING WORD PROBLEM. Do not solve.
How much 22% alcohol solution must be added to a 50-gallon solution of 83% alcohol to obtain a mixture that is 60% alcohol?

Let x = amt of 22% alcohol (gal)

y = ... 83% .. .. = 50 !

Concentration Not a variable

Concentration	Vol	Alc
22%	x	.22x
83%	50	.83(50)
60%	x+50	.60(50+x)

$.22x + .83(50) = .60(50+x)$

Amt of Alc = Amt of Alc.

17. (5 pts) SET UP THE FOLLOWING WORD PROBLEM. Do not solve.
John can mow Middlebrook Cemetery in 11 hours. Tracy can mow it in 15 hours. How long does it take them to mow the cemetery, if they work together?

Let x = how long John works (in hrs)

y = ... Tracy .. ..

They both start and end @ same time

$\therefore x = y$

1 job done = 1 job done

$\left(\frac{1}{11}\frac{\text{job John}}{\text{hr}}\right)(x \text{ hrs}) + \left(\frac{1}{15}\frac{\text{job Tracy}}{\text{hr}}\right)(x \text{ hrs}) = 1$

$$\frac{1}{11}x + \frac{1}{15}x = 1$$

Bonus! : Finish #17

LCD = $11 \cdot 15 = 165$

$$\frac{x}{11}\cdot\frac{15}{15} + \frac{x}{15}\cdot\frac{11}{11} = \frac{1}{1}\cdot\frac{(15)(11)}{(15)(11)} = \frac{165}{165}$$

$$\frac{15x + 11x}{LCD} = \frac{165}{LCD}$$

$$26x = 165$$

$$x = \frac{165}{26}$$

2. (5 pts) Suppose Tracy shows up 3 hours late to work, then joins John, and they finish working, together. How many hours does each of them end up working?

Let x = amt of time John works (hrs)

y = " " " " Tracy works "

$y = x - 3$

$\frac{1}{11}x + \frac{1}{15}y = 1$

$\frac{1}{11}x + \frac{1}{15}(x-3) = 1$

Also legit: x = hrs Tracy worked:

$\frac{1}{11}(x+3) + \frac{1}{15}x = 1$

LCD = 11·15 = 165

$\frac{x}{11}\cdot\frac{15}{15} + \frac{x-3}{15}\cdot\frac{11}{11} = 1 = \frac{165}{165} = \frac{165}{LCD}$

$\frac{15x + 11(x-3)}{LCD} = \frac{165}{LCD}$

$15x + 11x - 33 = 165$

165
33
198

$26x = 198$

$x = \frac{198}{26} = \frac{99}{13}$

$y = x+3 = \frac{99}{13} + \frac{3}{1}\cdot\frac{13}{13} = \frac{99+39}{13} = \frac{138}{13} = y$

4. (5 pts) Re-write the function $f(x)=7x^2-6x-9$ in the form $f(x)=a(x-h)^2+k$.

We already solved $f(x)=0$, earlier. This is subtly different:

Don't throw away the '7'

$f(x) = 7x^2 - 6x - 9$

$\frac{f(x)}{7} = x^2 - \frac{6}{7}x - \frac{9}{7}$

Scratch:
$-\frac{9}{49} - \frac{9}{7} = -\frac{72}{49}$

$= x^2 - \frac{6}{7}x + \left(\frac{3}{7}\right)^2 - \frac{9}{49} - \frac{9}{7}\cdot\frac{7}{7}$

$= \left(x - \frac{3}{7}\right)^2 - \frac{72}{49}$ ⟶

$f(x) = 7\left(x - \frac{3}{7}\right)^2 - \frac{72}{7}$

$(h,k) = \left(\frac{3}{7}, -\frac{72}{7}\right)$

$a(x-h)^2 + k$