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WEEK 2 WRITTEN SOL'NS

H. MILLS

① $y = 5x - 11$

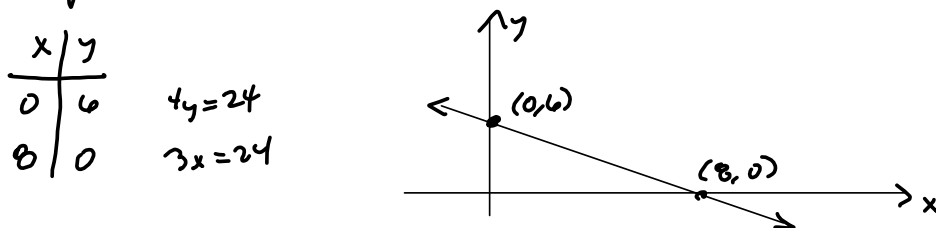
② slope = $m = 5$

③ y-intercept is $(0, -11)$

④ Any line parallel to $y = 5x - 11$ has slope $m = 5$

⑤ Any line perpendicular to $y = 5x - 11$ has slope $-\frac{1}{5} = m_{\perp}$

② we graph the line $3x + 4y = 24$ by the intercept method.



③ we find an eq'n of the line through the points

① $A = (x_1, y_1) = (3, 2)$ and $B = (x_2, y_2) = (-5, 6)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 2}{-5 - 3} = \frac{4}{-8} = -\frac{1}{2} \implies y = m(x - x_1) + y_1$

$y = -\frac{1}{2}(x - 3) + 2$

STOP!
THIS IS
PERFECT FINAL
ANSWER

Even if you're asked, specifically, for $y = mx + b$, this is still the most efficient way to get there. No nonsense about solving for b . Instead, you just follow your nose from $m \& (x_1, y_1)$

$y = m(x - x_1) + y_1 = -\frac{1}{2}(x - 3) + 2 = -\frac{1}{2}x + \frac{3}{2} + 2 = -\frac{1}{2}x + \frac{7}{2} = y$

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- ③ (b) An eqn of the line parallel to the line from part (a) and passing thru $(4, 11)$ has slope $m = -\frac{1}{2}$ like part a, so

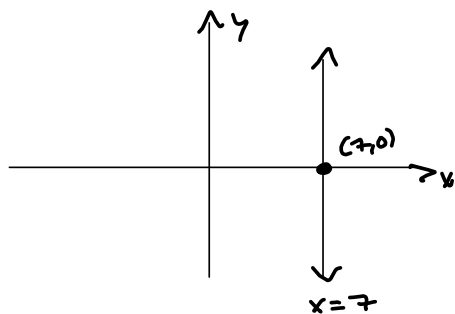
$$y = -\frac{1}{2}(x-4) + 11$$

- (c) An eqn of the line ^{to} the line from part (a) and passing thru $(4, 11)$ is $y = m_{\perp}(x-4) + 11$, where $m_{\perp} = \frac{-1}{m} = \frac{-1}{-\frac{1}{2}} = 1 \cdot \frac{2}{1} = 2$

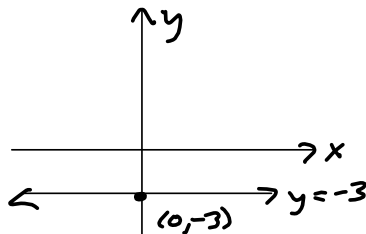
$$\text{so, } y = 2(x-4) + 11$$

- (4) we sketch degenerate lines:

- (a) $x=7$ is the vertical line that passes thru $(7, 0)$.



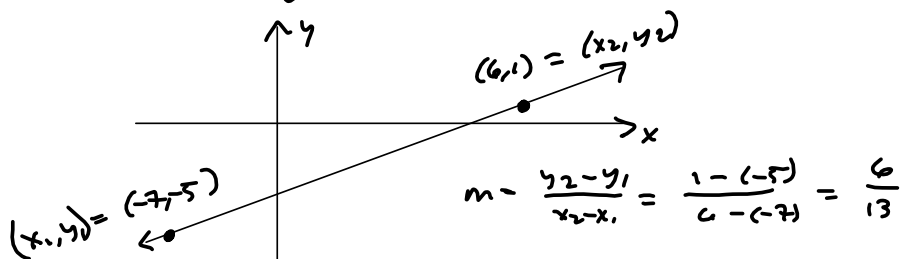
- (b) $y=-3$ is horizontal



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⑤ we find an eq'n of the line shown:

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

$y = \frac{6}{13}(x + 7) - 5$ STOP

$= \frac{6}{13}x + \frac{42}{13} - \frac{5 \cdot 13}{13} = \frac{6}{13}x + \frac{42 - 65}{13} = \frac{6}{13}x - \frac{23}{13} = y$

$y \approx 0.461538461538x - 1.76923076923$ Medium

⑥ $2x^2 + 9x - 35 = 0$ Worst

$\Rightarrow a=2, b=9, c=-35$
 $\Rightarrow b^2 - 4ac = 9^2 - 4(2)(-35)$
 $= 81 + 280 > 0 \Rightarrow 2 \text{ real solns}$
 $= 81 + 280 = 361$
 Check $\sqrt{361} = 19!$ It's a perfect square! So $\boxed{2 \text{ distinct, rational zeros.}}$

$$\begin{array}{r} 435 \\ 8 \\ \hline 280 \end{array}$$

$$\textcircled{b} \quad x^2 - 6x + 12 = 0 \Rightarrow$$

$$a = 1, b = -6, c = 12$$

$$\Rightarrow b^2 - 4ac = 6^2 - 4(1)(12)$$

$$= 36 - 48 = -12 < 0 \Rightarrow$$

2 imaginary sol'ns

$$\textcircled{c} \quad x^2 - 6x - 12 = 0 \Rightarrow$$

$$a = 1, b = -6, c = -12$$

$$\Rightarrow b^2 - 4ac = 6^2 - 4(1)(-12)$$

$$= 36 + 48 = 84$$

84 is not a perfect square,

$$81 = 9^2, 100 = 10^2$$

$$\textcircled{d} \quad x^2 - 6x + 9$$

$$\Rightarrow a = 1, b = -6, c = 9$$

$$\Rightarrow b^2 - 4ac = 6^2 - 4(1)(9) = 36 - 36 = 0.$$

This is a repeated root, Rational!
(one root, twice)

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(7) We solve by completing the square.

$$\textcircled{a} \quad x^2 - 6x - 12 = 0$$

$$x^2 - 6x = 12 \quad \left(\frac{6}{2}\right)^2 = (3)^2 \rightarrow 9$$

$$x^2 - 6x + 9 = 12 + 9$$

$$(x-3)^2 = 21$$

$$x-3 = \pm\sqrt{21}$$

$$\boxed{x = 3 \pm \sqrt{21}}$$

$$\textcircled{b} \quad x^2 - 6x + 12 = 0$$

$$x^2 - 6x = -12$$

$$x^2 - 6x + 9 = -12 + 9$$

$$(x-3)^2 = -3$$

$$x-3 = \pm\sqrt{-3} = \pm i\sqrt{3}$$

$$\boxed{x = 3 \pm i\sqrt{3} \text{ or } 3 \pm \sqrt{3}i}$$

$$\textcircled{c} \quad 2x^2 + 9x - 35 = 0$$

$$x^2 + \frac{9}{2}x = \frac{35}{2} \quad \left(\frac{9}{2}\right)^2 = \left(\frac{9}{4}\right)^2 = \frac{81}{16}$$

$$x^2 + \frac{9}{2}x + \left(\frac{9}{4}\right)^2 = \frac{35}{2} \cdot \frac{8}{8} + \frac{81}{16} = \frac{280 + 81}{16} = \frac{361}{16}$$

$$\Rightarrow \left(x + \frac{9}{4}\right)^2 = \frac{361}{16}$$

$$\Rightarrow x + \frac{9}{4} = \pm \sqrt{\frac{361}{16}} = \pm \frac{\sqrt{361}}{\sqrt{16}} = \pm \frac{19}{4}$$

$$\Rightarrow x = \frac{-9 \pm 19}{4} \begin{cases} \rightarrow \frac{-9 + 19}{4} = \frac{10}{4} = \frac{5}{2} \\ \rightarrow \frac{-9 - 19}{4} = \frac{-28}{4} = -7 \end{cases}$$

$$\boxed{x = -7, \frac{5}{2}}$$

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② Solve by factoring

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$$\textcircled{2} \quad 2x^2 + 9x - 35 = 0. \text{ By previous work,}$$

$$x = -7, \frac{5}{2} \Rightarrow 2x^2 + 9x - 35 = 2(x+7)\left(x - \frac{5}{2}\right)$$

$= (x+7)(2x-5)$ is reverse-engineered factored form,

Other Method

$(2)(-35) = -(2)(5)(7) \rightarrow (2)(7) - 5 = 9$
 want a grouping that
 adds up to '9' for the '9x' in the middle.

14-5 does it

$$\text{so } 2x^2 + 14x - 5x - 35$$

$$= 2x(x+7) - 5(x+7)$$

$$= (x+7)(2x-5)$$

Either way, $x+7=0$ or $2x-5=0$
 $x = -7$ or $x = \frac{5}{2}$

Ⓟ Didn't make it to print, I guess

$$70x^2 + 33x - 324 = 0$$

$$\rightarrow a=70, b=33, c=-324$$

$$\rightarrow b^2 - 4ac = 33^2 - 4(70)(-324)$$

$$= 1089 + 9120$$

$$= 9189 \frac{1}{2}$$

$$\sqrt{91804} = 303, 50$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-33 \pm 303}{2(70)}$$

$$\frac{-33 + 303}{140} = \frac{270}{140} = \frac{27}{14} = x$$

$$\frac{-33 - 303}{140} = -\frac{336}{140} = -\frac{168}{70} = -\frac{84}{35} = -\frac{12}{5} = x$$

Now, Reverse-engineer it:

$$70 \left(x - \left(-\frac{12}{5}\right)\right) \left(x - \frac{27}{14}\right)$$

$$= 5 \cdot 14 \left(x + \frac{12}{5}\right) \left(x - \frac{27}{14}\right)$$

$$= (5x + 12)(14x - 27) = 0$$

$$\rightarrow x = -\frac{12}{5}, \frac{27}{14} \checkmark$$

Wanted to see the factored form.