1340 WEEK 2 WRITTEN SOL'NS H. MILLS

① $y=5x-11$

(a) slope = $\boxed{m=5}$

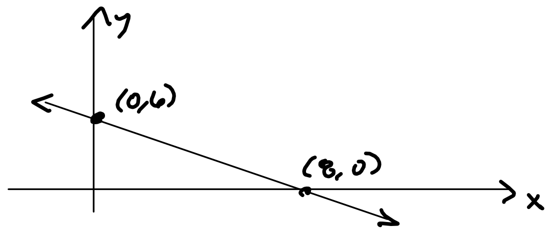
(b) $\boxed{\text{y-intercept is } (0,-11)}$

(c) $\boxed{\text{Any line parallel to } y=5x-11 \text{ has slope } m=5}$

(d) $\boxed{\text{Any Line perpendicular to } y=5x-11 \text{ has slope } -\frac{1}{5}=m_\perp}$

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

x	y	
0	6	$4y=24$
8	0	$3x=24$



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

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

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

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

STOP! THIS IS PERFECT FINAL ANSWER for me

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, (& WebAssign) you just follow your nose from m & (x_1,y_1)

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

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3 b An eq'n 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

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

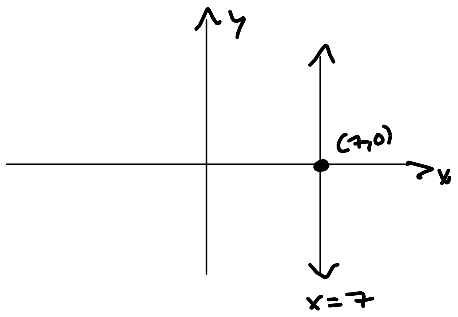
c An eq'n of the line to the line from part a and passing thru (4,11) is

$y = m_{\perp}(x-4)+11$, where $m_{\perp} = \frac{-1}{m} = \frac{-1}{-\frac{1}{2}} = 1 \cdot \frac{2}{1} = 2$

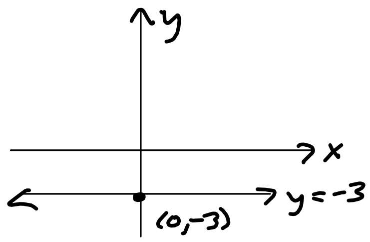
so, $\boxed{y = 2(x-4)+11}$

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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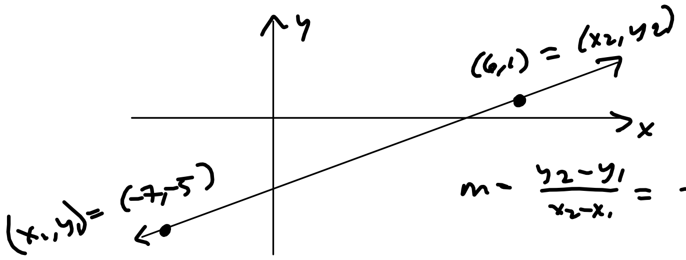
(5) we find an eq'n of the line shown:



$$m = \frac{y_2-y_1}{x_2-x_1} = \frac{1-(-5)}{6-(-7)} = \frac{6}{13}$$

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

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

$mx+b = y$

$= \frac{6}{13}x + \frac{42}{13} - \frac{5}{1}\cdot\frac{13}{13} = \frac{6}{13}x + \frac{42-65}{13} = \boxed{\frac{6}{13}x - \frac{23}{13} = y}$

Medium

$\boxed{y \approx 0.461538461538\,x - 1.76923076923}$

Worst

(6) $2x^2+9x-35=0$

(a) $\Longrightarrow a=2, b=9, c=-35$

$\Longrightarrow b^2-4ac = 9^2-4(2)(-35)$

$= 81+8(35) > 0 \longrightarrow$ 2 real sol'ns

$4 \times 35 \cdot 8 = 280$

$= 81+280 = 361$

Check $\sqrt{361} = 19$! It's a perfect square! So $\boxed{\text{2 distinct, rational zeros.}}$

(b) $x^2-6x+12=0 \Rightarrow$

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

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

$= 36-48 = -12 < 0 \Rightarrow$ $\boxed{\text{2 imaginary sol'ns}}$

(c) $x^2-6x-12=0 \Rightarrow$

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

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

$= 36+48 = 84$

84 is not a perfect square,

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

(d) x^2-6x+9

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

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

$\boxed{\text{This is a repeated root, Rational (one root, twice)}}$

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(7) We solve by completing the square.

(a) $x^2-6x-12=0$

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

$x^2-6x+3^2=12+9$

$(x-3)^2=21$

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

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

(b) $x^2-6x+12=0$

$x^2-6x=-12$

$x^2-6x+3^2=-12+9$

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

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

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

(c) $2x^2+9x-35=0$

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

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

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

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

$\Rightarrow x=\frac{-9\pm19}{4}$

$\frac{-9+19}{4}=\frac{10}{4}=\frac{5}{2}$

$\frac{-9-19}{4}=\frac{-28}{4}=-7$

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

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(8) Solve by factoring

(a) $2x^2+9x-35=0$. By previous work,

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

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

Other Method

$\to (2)(7)-5=9$

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

14-5 does it

so $2x^2+14x-5x-35$

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

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

Either way, $x+7=0$ or $2x-5=0$

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

8b Didn't make it to print, I guess

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

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

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

$= 1089+90720$

$= 91809$

$\sqrt{91809} = 303$, so

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

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

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

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

Now, Reverse-engineer it:

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

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

$= \boxed{(5x+12)(14x-27)=0}$

$\Rightarrow x=-\frac{12}{5}, \frac{27}{14}$ ✓

Wanted to see the factored form.