

① 10 pts

$$5x - 1 = 3x + 2$$

$$2x = 3$$

$$x = \frac{3}{2}$$

②

$$\frac{2}{7}x + \frac{12}{5} = \frac{1}{2} \quad \text{LCD} = 2 \cdot 5 \cdot 7$$

5 pts

$$\frac{2x}{7} \cdot \frac{2 \cdot 5}{2 \cdot 5} + \frac{12}{5} \cdot \frac{2 \cdot 7}{2 \cdot 7} = \frac{1}{2} \cdot \frac{5 \cdot 7}{5 \cdot 7}$$

$$\frac{20x + 168}{\text{LCD}} = \frac{35}{\text{LCD}}$$

$$20x = 35 - 168 = -133$$

$$x = \frac{-133}{20}$$

③ 5 pts

$$6x^2 = 47$$

$$x^2 = \frac{47}{6}$$

$$x = \pm \sqrt{\frac{47}{6}} = \pm \frac{\sqrt{47}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \pm \frac{\sqrt{282}}{6}$$

$$x = \pm \frac{\sqrt{282}}{6}$$

4 (5pts)

$$3x^2 - 28x + 67 = 0$$

$$a=3, b=-28, c=67$$

$$b^2 - 4ac = (-28)^2 - 4(3)(67)$$

$$= 784 - 804$$

$$= -20$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{28 \pm \sqrt{-20}}{2(3)}$$

$$= \frac{28 \pm 2i\sqrt{5}}{6} = \boxed{\frac{14 \pm i\sqrt{5}}{3} = x}$$

$$\begin{array}{r} 678 \\ -28 \\ \hline 224 \\ 560 \\ \hline 784 \end{array}$$

$$\begin{array}{r} 67 \\ 12 \\ \hline 134 \\ 670 \\ \hline 804 \end{array}$$

$$\begin{array}{r} 2 \overline{)20} \\ 2 \overline{)10} \\ \hline 5 \end{array}$$

5 (5pts)

$$9x^2 + 12x + 4 = 0$$

$$b^2 - 4ac = 12^2 - 4(9)(4)$$

$$= 144 - 144$$

$$= 0$$

So, one real (repeated) solution

RATIONAL SOLNS

$$\begin{array}{r} 2 \overline{)12} \\ \hline 4 \\ \hline 144 \end{array}$$

6 (5pts)

$$4x^2 - 20x + 29 = 0$$

$$b^2 - 4ac = (-20)^2 - 4(4)(29)$$

$$= 400 - 464 = -64 \rightarrow$$

2 NONREAL SOLNS

$$\begin{array}{r} 5 \overline{)29} \\ 16 \\ \hline 174 \\ 290 \\ \hline 464 \end{array}$$

7)  $6x^2 = 47$

$6x^2 - 47 = 0$

$a=6, b=0, c=-47$

$b^2 - 4ac = 0^2 - 4(6)(-47)$

$= 1128 \Rightarrow$  2 real solutions

$$\begin{array}{r} 2 \overline{) 1128} \\ \underline{2 \ 564} \\ 2 \overline{) 282} \\ \underline{3 \ 141} \\ 47 \end{array}$$

5p

$$\begin{array}{r} 2 \ 47 \\ \underline{24} \\ 1138 \\ \underline{940} \\ 1128 \end{array}$$

8)  $x^2 - 3x - 28$

10pts

$= (x-7)(x+4) = 0$

$\Rightarrow x \in \{-4, 7\}$

$(105)(8)$

$= 840$

9) 5pts  $8x^2 + 22x - 105$

$= 8x^2 + 42x - 20x - 105$   
 $= 2x(4x + 21) - 5(4x + 21)$   
 $= (4x + 21)(2x - 5) = 0$

$\Rightarrow x \in \left\{ -\frac{21}{4}, \frac{5}{2} \right\}$

$22 = 32 - 10 \quad -320$   
 $= 42 - 20 \quad -840$

10 5pts

$$x^2 + 4x + 9 = 0$$

$$x^2 + 4x + 2^2 = -9 + 4$$

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

$$x+2 = \pm \sqrt{-5}$$

$$x = -2 \pm i\sqrt{5}$$

$$x \in \left\{ -2 \pm i\sqrt{5} \right\}$$

11 5pts

$$5x^2 + 6x - 9 = 0$$

$$5\left(x^2 + \frac{6}{5}x\right) = 9$$

$$5\left(x^2 + \frac{6}{5}x + \left(\frac{3}{5}\right)^2\right) = 9 + 5\left(\frac{9}{25}\right) = 9 + \frac{9}{5}$$

$$5\left(x + \frac{3}{5}\right)^2 = \frac{54}{5}$$

$$\left(x + \frac{3}{5}\right)^2 = \frac{54}{25}$$

$$x + \frac{3}{5} = \pm \sqrt{\frac{54}{25}} = \pm \frac{3\sqrt{6}}{5}$$

$$x = \frac{-3 \pm 3\sqrt{6}}{5}$$

$$x \in \left\{ \frac{-3 \pm 3\sqrt{6}}{5} \right\}$$

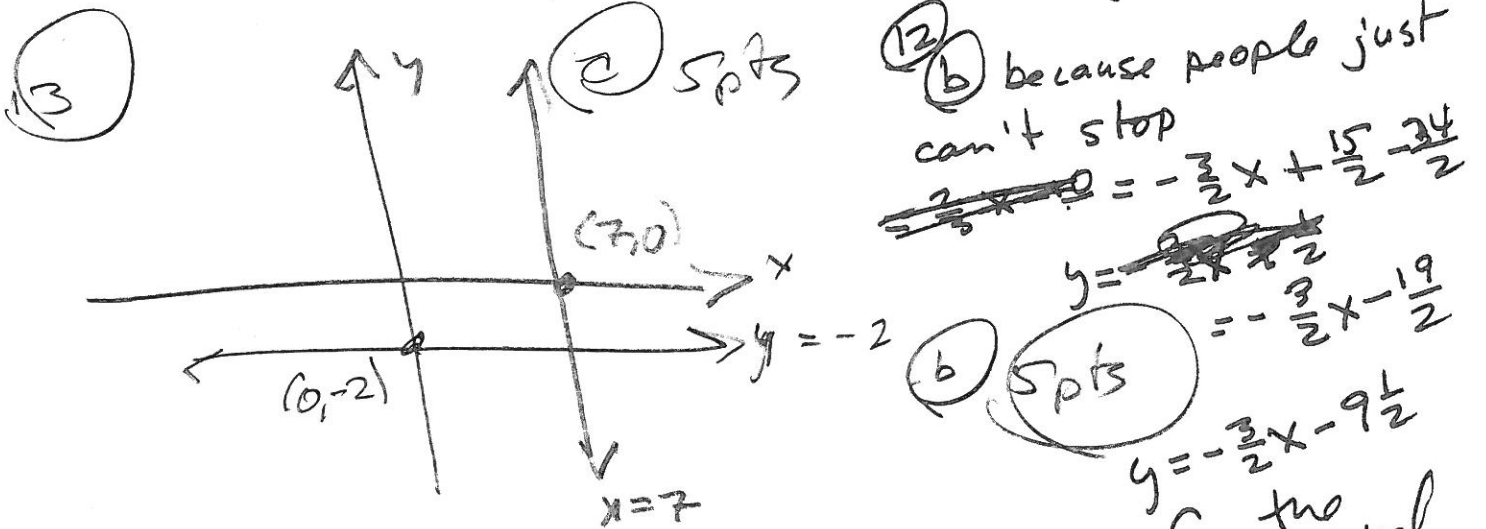
$$\begin{array}{r} 2 \overline{) 54} \\ \underline{4} \phantom{0} \\ 14 \\ 3 \overline{) 27} \\ \underline{6} \phantom{0} \\ 21 \\ 3 \overline{) 9} \\ \underline{9} \\ 0 \end{array}$$

121

12 a  $\overset{T1}{\text{spts}}$   
 $m = \frac{2}{3}, (x_1, y_1) = (5, -17)$

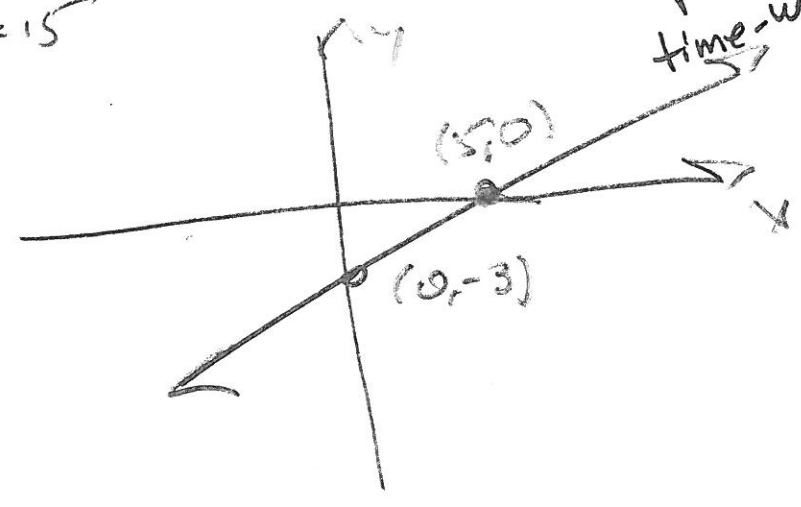
$y = \frac{2}{3}(x-5) - 17$  parallel  
 Pissed I have to do this:  
 $= \frac{2}{3}x - \frac{10}{3} - \frac{51}{3}$   
 $y = \frac{2}{3}x - \frac{61}{3}$

b  $\text{spts}$   
 $y = -\frac{3}{2}(x-5) - 7$  perpendicular.  
 = more pissed!  
 $y = \frac{2}{3}x - 20\frac{1}{3}$



14  $3x - 5y = 15$

|   |    |
|---|----|
| x | y  |
| 0 | -3 |
| 5 | 0  |



for the pathological time-wasters.

MAT 121 T1

15 a 10pts

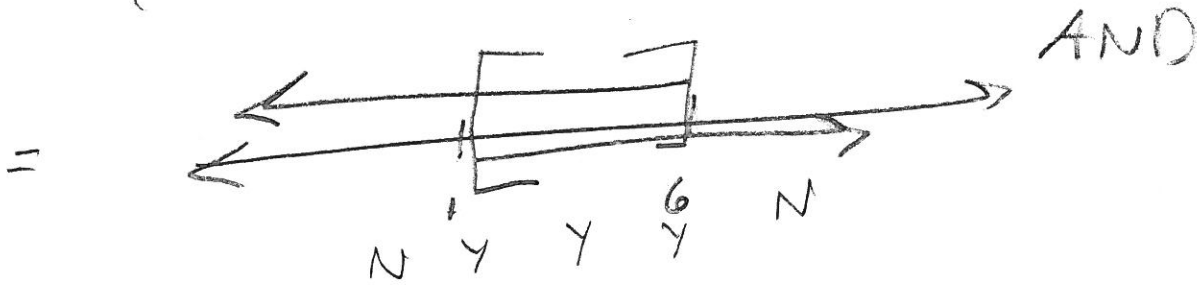
$$|2x-7| \leq 5$$

$$2x-7 \leq 5 \text{ and } 2x-7 \geq -5$$

$$2x \leq 12$$

$$2x \geq 2$$

$$\left\{ x \mid x \leq 6 \text{ and } x \geq 1 \right\}$$



$$= [1, 6]$$

b 5pts  $| -2x+7 | = | -(2x-7) | = | 2x-7 | < 5$

See part (a) (1,6)  
Just w/o endpoints.

c 5pts

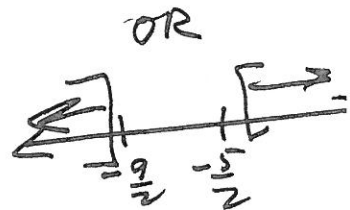
$$|2x+7| + 3 \geq 5$$

$$|2x+7| \geq 2$$

$$2x+7 \geq 2 \text{ OR } 2x+7 \leq -2$$

$$2x \geq -5 \text{ OR } 2x \leq -9$$

$$\left\{ x \mid x \geq -\frac{5}{2} \text{ OR } x \leq -\frac{9}{2} \right\} = (-\infty, -\frac{9}{2}] \cup [-\frac{5}{2}, \infty)$$



MAT 121

T1

(d) (5 pts)

$$|5x-3| + 6 < 3$$

$$|5x-3| < -3$$

NEVAH!

(16) (5 pts)

Let  $x =$  amt of 37% alcohol (gal)

$y =$  " " 75% " " "

Then  $x + y = 50$  and

$$.37x + .75y = .5(50)$$

(17) (5 pts)

$x =$  amt Jennifer won (\$)

$$\left(\frac{1}{3}\right)\left(\frac{1}{2}x\right)(.03) + \left(\frac{2}{3}\right)\left(\frac{1}{2}x\right)(.08) = 950$$

(B1) (5 pts)

Let  $x =$  amt of time they worked together (hrs)

$$\text{Then } \frac{1}{6}x + \frac{1}{10}x = 1$$

$$10x + 6x = 60$$

$$16x = 60$$

$$x = \frac{60}{16} = \frac{30}{8} = \frac{15}{4}$$

121 E1

B2

~~Same job as B1~~ No.  $x$  = amt of time Bill works (hrs).

Tamara starts 2 hrs late

$$\frac{1}{6}(x-2) + \frac{1}{10}x = 1$$

$$10(x-2) + 6x = 60$$

$$10x - 20 + 6x = 60$$

$$16x = 80$$

$$x = \frac{80}{16} = \frac{40}{8} = \frac{20}{4} = \frac{10}{2} = 5!$$

18

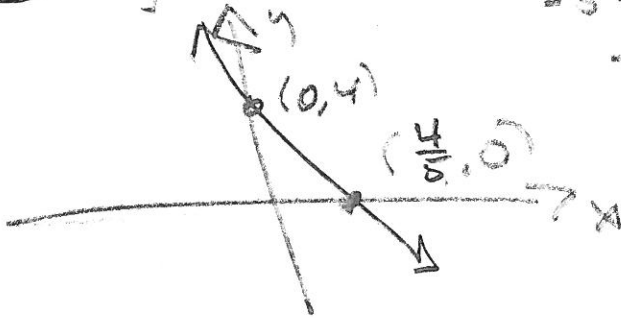
$$x = 5$$

Tamara works

$$x - 2 = 3 \text{ hrs}$$

B3

$$y = -5x + 4$$



$$-5x + 4 = 0$$

$$-5x = -4$$

$$x = \frac{4}{5}$$



121 51

134

$$f(x) = 3x^2 + 4x + 9$$

$$= 3(x^2 + \frac{4}{3}x) + 9$$

$$= 3(x^2 + \frac{4}{3}x + (\frac{2}{3})^2) + 9 - 3(\frac{4}{9})$$

$$= 3(x + \frac{2}{3})^2 + \frac{27-4}{3}$$

$$y = 3(x + \frac{2}{3})^2 + \frac{23}{3}$$

135

$$5\sqrt{x+3} = x+5$$

$$25(x+3) = (x+5)^2 = x^2 + 10x + 25$$

$$25x + 75 = x^2 + 10x + 25 = 25x + 75$$

$$x^2 - 15x - 50 = 0$$

$$x = 15x + (\frac{15}{2})^2 = \frac{225}{4} + \frac{200}{4}$$

$$(x - \frac{15}{2})^2 = \frac{425}{4}$$

$$x - \frac{15}{2} = \pm \frac{5\sqrt{17}}{2}$$

$$x = \frac{15 \pm 5\sqrt{17}}{2}$$

Some answer  
twice.  
Haha

I know I  
2 solutions,  
but I  
can't get it  
to check

~~$5\sqrt{10+3} = 10+5$~~   
No

$$5\sqrt{5+3}$$

$$5\sqrt{425}$$

$$5\sqrt{85}$$

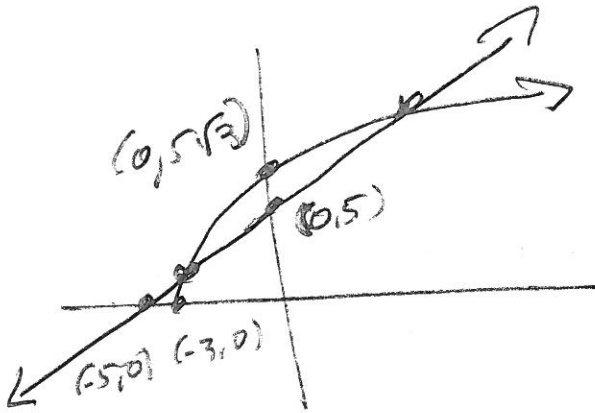
$$17$$

x =

$$5\sqrt{\frac{15 \pm 5\sqrt{17}}{2} + 3} =$$

$$5\sqrt{\frac{24 \pm 5\sqrt{17}}{2}} = \frac{5}{2}\sqrt{24 \pm 5\sqrt{17}}$$

$x$  is approximately  $-2.807764060$  or  $17.80776406$   
 Very difficult to check under a time control.



$$5 \sqrt{425}$$

$$5 \sqrt{\frac{85}{17}}$$

$$x^2 - 15x - 50 = 0$$

$$x^2 = 15x + \left(\frac{15}{2}\right)^2 = 50 + \frac{225}{4} = \frac{200 + 225}{4} = \frac{425}{4}$$

$$\left(x - \frac{15}{2}\right)^2 = \frac{425}{4}$$

$$x - \frac{15}{2} = \pm \frac{\sqrt{425}}{2}$$

$$x = \frac{15 \pm 5\sqrt{17}}{2}$$

$$5 \sqrt{\frac{15 + 5\sqrt{17}}{2} + 3} = 5 \sqrt{\frac{21 + 5\sqrt{17}}{2}}$$

$$= \frac{5}{2} \sqrt{42 + 10\sqrt{17}}$$