

#1 The point the two graphs intersect is the solution

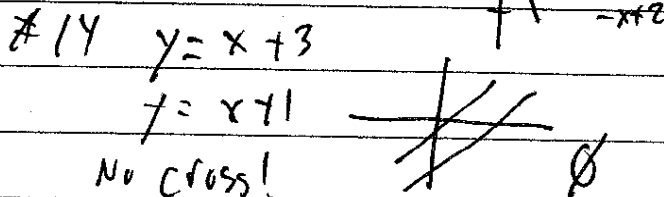
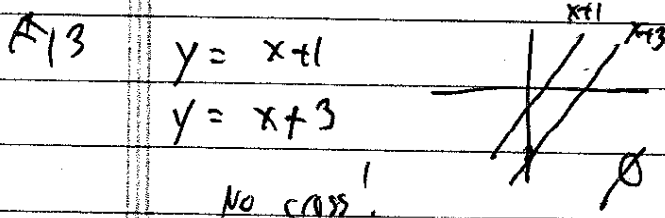
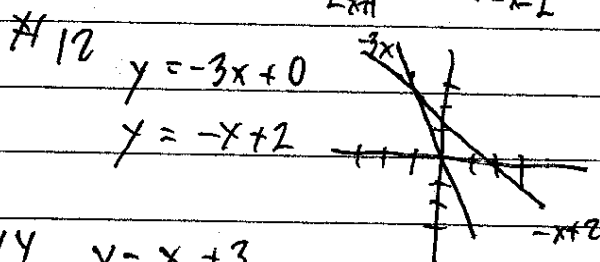
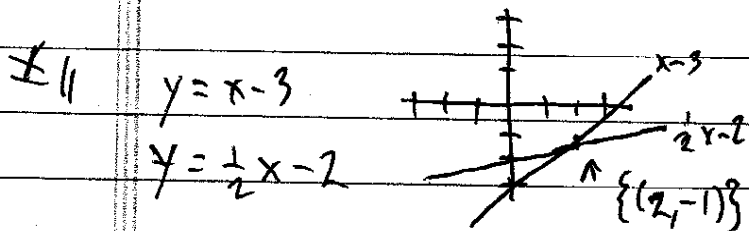
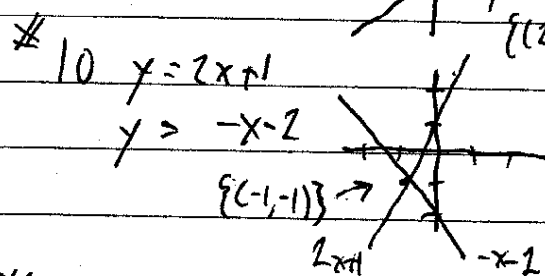
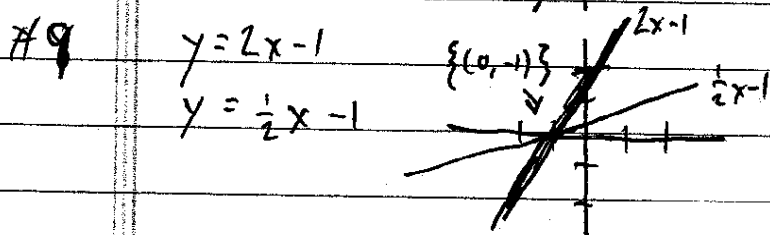
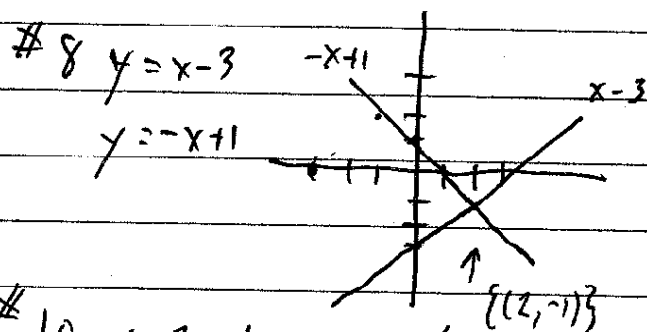
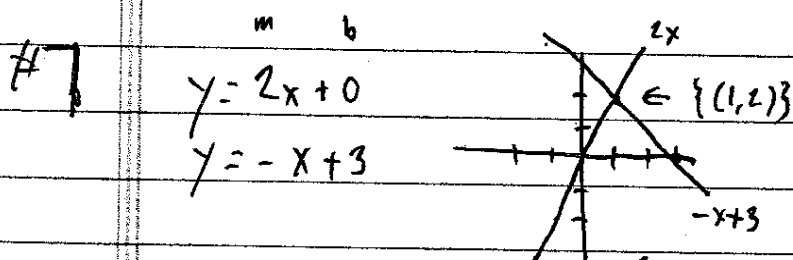
#2 If the 2 lines don't intersect, there is no solution

#3 It is ~~inaccurate~~ inaccurate.

#4 We eliminate one variable by substituting it from one equation into the other

#5 If the equation simplifies to something dumb like $5=3$.

#6 If the solution becomes like $5=5$, then all answers work.



#15 $y = -\frac{1}{2}x + 4$ Same line!
 $y = -\frac{1}{2}x + 4$ All values
 $\{(x,y) \mid x+2y=8\}$

#16 $y = \frac{2}{3}x - 2$ Same line!
 $y = \frac{2}{3}x - 2$ All values
 $\{(x,y) \mid 2x-3y=6\}$

#17 - #20 X Homework

#21 $y = x - 5 \rightarrow$ stick in "y"
 $2x - 5y = 1$
 $2x - 5(x - 5) = 1$
 $2x - 5x + 25 = 1$
 $-3x = -24$
 $x = 8$ plug it into $y = x - 5$
 $y = 8 - 5 = 3$ $\{(8, 3)\}$
 independent

#22 $y = x + 4$
 $3y - 5x = 6$
 $3(x + 4) - 5x = 6$
 $3x + 12 - 5x = 6$
 $-2x = -6$
 $x = 3$ plug into $y = x + 4$
 $y = 3 + 4 = 7$ $\{(3, 7)\}$
 independent

#23 $x = 2y - 7 \rightarrow$ stick in
 $3x + 2y = -5$
 $3(2y - 7) + 2y = -5$
 $6y - 21 + 2y = -5$
 $8y = 16$ $y = 2$ plug into $x = 2y - 7$
 $x = 2(2) - 7 = -3$
 $\{(-3, 2)\}$ indep.

#24 $x = y + 3 \rightarrow$ plug in
 $3x - 2y = 4$
 $3(y + 3) - 2y = 4$
 $3y + 9 - 2y = 4$
 $y = -5$ stick into $x = y + 3$
 $x = -5 + 3 = -2$
 $\{(-2, -5)\}$ indep.

#25 $x = y + 5 \rightarrow$ stick in
 $2x = 2y + 14$
 $2(y + 5) = 2y + 14$
 $2y + 10 = 2y + 14$
 $0 = 4$ inconsistent! \emptyset

#26 $y = 2x - 3 \rightarrow$ plug in
 $2y = 4x - 6$
 $2(2x - 3) = 4x - 6$ dependent
 $4x - 6 = 4x - 6$ $\{(x,y) \mid 2x - y = 3\}$
 $0 = 0$

#27-30 Homework!

#31

$$x - y = 0 \rightarrow y = x \quad \downarrow \text{plug in}$$

$$2x + 3y = 35 \quad \downarrow$$

$$2x + 3x = 35$$

$$5x = 35$$

$$x = 7 \quad \text{stick into } x = y = 0$$

$$x - 7 = 0$$

$$x = 7 \quad \{(7, 7)\}$$

independent

#32

~~cancel~~

$$2y = x + 6 \rightarrow x = 2y - 6 \quad \downarrow \text{plug in}$$

$$-3x + 2y = -2 \quad \downarrow$$

$$-3(2y - 6) + 2y = -2$$

$$-6y + 18 + 2y = -2$$

$$-4y = -20$$

$$y = 5 \quad \text{stick into } 2y = x + 6$$

$$2(5) = x + 6$$

$$10 - 6 = x$$

$$x = 4$$

$$\{(4, 5)\} \text{ independent}$$

#33

$$x = -y + 40 \quad \downarrow \text{plug in}$$

$$0.1x + 0.08y = 3.5 \quad \text{multiply by } 100 \rightarrow 10x + 8y = 350$$

$$\downarrow$$

$$10(-y + 40) + 8y = 350$$

$$-10y + 400 + 8y = 350$$

$$-2y = -50$$

$$y = 25$$

$$\text{stick } y = 25 \text{ into } x = -y + 40$$

$$x = -25 + 40 = 15$$

$$\{(15, 25)\} \text{ independent}$$

#34

$$x = y + 10 \quad \downarrow \text{plug in}$$

$$(x100) \quad 20x + 5y = 700$$

$$20(y + 10) + 5y = 700$$

$$20y + 200 + 5y = 700$$

$$25y = 500$$

$$y = 20 \quad \text{plug into } x = y + 10$$

$$x = 20 + 10 = 30$$

$$\{(30, 20)\} \text{ independent}$$

#35

$$y = 2x - 30$$

$$\left(\frac{1}{5}x - \frac{1}{2}y = -1 \rightarrow 10 \left(\frac{1}{5}x - \frac{1}{2}y \right) = 10(-1) \right)$$

simplify

plug in

$$2x - 5y = -10$$

$$2x - 5(2x - 30) = -10$$

$$2x - 10x + 150 = -10$$

$$-8x = -160$$

$$x = 20 \quad \text{stick into } y = 2x - 30$$

$$y = 2(20) - 30 = 40 - 30 = 10$$

$$\{(20, 10)\}$$

independent

#36 $3x - 5y = 4$
 $y = \frac{3}{4}x - 2$ $\left\{ \begin{array}{l} \text{stick it} \\ \text{in} \end{array} \right.$

$3x - 5\left(\frac{3}{4}x - 2\right) = 4$
 $3x - \frac{15}{4}x + 10 = 4$

\downarrow
 is also $\frac{12x}{4} - \frac{15x}{4} + 10 = 4$

$-\frac{3}{4}x = -6$
 $x = -6\left(-\frac{4}{3}\right)$
 $x = \frac{24}{3} = 8$

plug into $y = \frac{3}{4}x - 2$
 $y = \frac{3}{4}(8) - 2 = 6 - 2 = 4$
 $\{(8, 4)\}$ independent

#37 X

#38 $y = 2x - 3$ $\left\{ \begin{array}{l} \text{plus it in} \\ \text{minus it in} \end{array} \right.$
 $y = 3x - 3$

\Rightarrow ~~$2x - 3 = 3x - 3$~~
 $0 = x$ plug into $y = 2x - 3$
 $y = 2(0) - 3 = -3$
 $\{(0, -3)\}$ independent

#39 X

#40 $y = 3(x - 4) \rightarrow y = 3x - 12$
 $3x - y = 12$ $\left\{ \begin{array}{l} \text{plug in} \\ \downarrow \end{array} \right.$

$3x - (3x - 12) = 12$
 $3x - 3x + 12 = 12$
 $0 = 0$ dependent
 $\{(x, y) \mid 3x - y = 12\}$

#41, 42 X X

#43 $x = y - 0.375$ $\left\{ \begin{array}{l} \text{plug in} \\ \text{minus it in} \end{array} \right.$
 $1.5x - 3y = -2.25$

$1.5(y - 0.375) - 3y = -2.25$
 $1.5y - 0.5625 - 3y = -2.25$
 $-1.5y = -1.6875$

$y = 1.125$ plug into
 $x = y - 0.375$
 $x = 0.75$ $\{(0.75, 1.125)\}$
 independent

#44 $y = 2x + 1.875$ $\left\{ \begin{array}{l} \text{plug in} \\ \text{minus it in} \end{array} \right.$
 $2.5y - 3.5x = 11.8125$

$2.5(2x + 1.875) - 3.5x = 11.8125$
 $5x - 3.5x + 4.6875 = 11.8125$
 $1.5x = 11.8125 - 4.6875$
 $x = 4.75$

$y = 2(4.75) + 1.875 = 11.375$
 $\{(4.75, 11.375)\}$ independent

#1 The addition method

#2 To eliminate a variable by adding the equations

#3 Sometimes we must multiply both equations by same number

#4 If we get something like $8=7$

#5 If we end up with $0=0$

#6 Coefficients of equations are in the same form.

#7

$$\begin{array}{r} x + y = 7 \\ + \quad x - y = 9 \\ \hline 2x + 0y = 16 \\ x = 8 \text{ plug into } x + y = 7 \\ 8 + y = 7 \\ y = -1 \end{array} \quad \{(8, -1)\}$$

#8

$$\begin{array}{r} 3x - 4y = 11 \\ + \quad -3x + 2y = -7 \\ \hline 0x - 2y = 4 \\ y = -2 \text{ plug into first eq.} \\ 3x - 4(-2) = 11 \\ 3x + 8 = 11 \\ 3x = 3 \\ x = 1 \end{array} \quad \{(1, -2)\}$$

#9, 10, 11, 12 X

#13

$$\begin{array}{r} 2x - 5y = 13 \text{ multiply by } 3 \\ 3x + 4y = -15 \text{ multiply by } -2 \\ \hline 6x - 15y = 39 \\ + \quad -6x - 8y = 30 \\ \hline 0x - 23y = 69 \\ y = -3 \text{ plug into first} \end{array}$$

$$\begin{array}{r} 2x - 5(-3) = 13 \\ 2x + 15 = 13 \\ 2x = -2 \\ x = -1 \end{array} \quad \{(-1, -3)\}$$

#14 X

#15

$$\begin{array}{r} 2x = 3y + 11 \text{ move around to fix form} \\ 7x - 4y = 6 \\ \hline 2x - 3y = 11 \text{ multiply by } 4 \\ 7x - 4y = 6 \text{ multiply by } -3 \\ \hline 8x - 12y = 44 \\ + \quad -21x + 12y = -18 \\ \hline -13x + 0y = 26 \quad x = -2 \end{array}$$

~~#16~~

$$\begin{array}{r} -4 = 3y + 11 \\ 3y = -15 \quad y = -5 \end{array} \quad \{(-2, -5)\}$$

#16-21 X

#22 $4x + 3y = 2$ multiply by 3

$$\begin{array}{r} 4x + 3y = 2 \\ -12x - 9y = -6 \\ \hline 12x + 9y = 6 \\ + \quad -12x - 9y = -6 \\ \hline 0x + 0y = 0 \\ 0 = 0 \end{array}$$

dependent

$\{(x, y) \mid 4x + 3y = 2\}$

#23-24 X

#25 $\frac{1}{4}x + \frac{1}{3}y = 5$ multiply by -4

$$\begin{array}{r} \frac{1}{4}x + \frac{1}{3}y = 5 \\ x - y = 6 \\ \hline -x - \frac{4}{3}y = -20 \\ + \quad x - y = 6 \\ \hline 0x - \frac{7}{3}y = -14 \\ \frac{1}{3}y = \frac{14}{7} = 2 \\ y = 6 \text{ use } x - y = 6 \\ x - 6 = 6 \\ x = 12 \end{array}$$

$\{(12, 6)\}$

(hint) $-\frac{3}{3}y \rightarrow$

#26 $\frac{3x}{2} - \frac{2y}{3} = 10$ multiply by 2

$$\begin{array}{r} \frac{3x}{2} - \frac{2y}{3} = 10 \\ \frac{1}{2}x + \frac{1}{2}y = -1 \text{ multiply by } -2 \\ \hline 3x - \frac{4}{3}y = 20 \\ -x - y = 2 \text{ multiply by } 3 \\ \hline 3x - \frac{4}{3}y = 20 \\ + \quad -3x - 3y = 6 \\ \hline 0x - \frac{13}{3}y = 26 \\ -13y = 78 \\ y = -6 \end{array}$$

plug into $-x - y = 2$

$$\begin{array}{r} -x + 6 = 2 \\ -x = -4 \quad x = 4 \\ \{(4, -6)\} \end{array}$$

#27 $\frac{x}{4} - \frac{y}{3} = -4$ multiply by 12

$$\begin{array}{r} \frac{x}{4} - \frac{y}{3} = -4 \\ \frac{x}{8} + \frac{y}{6} = 0 \text{ multiply by } -24 \\ \hline 3x - 4y = -28 \\ -3x - 4y = 0 \\ \hline 0x - 8y = -28 \\ y = 6 \end{array}$$

plug into $\frac{x}{8} + \frac{y}{6} = 0$

$$\begin{array}{r} \frac{x}{8} + \frac{6}{6} = 0 \\ \frac{x}{8} = -1 \\ x = -8 \end{array}$$

$\{(-8, 6)\}$

28-30 X

31 $0.05x + 0.10y = 1.30$ multiply by -20

$$\begin{array}{r} x + y = 19 \\ -x - 2y = -26 \\ \hline x + y = 19 \\ \hline 0x - y = -7 \\ y = 7 \end{array}$$

Use $x + y = 19$ $\{(12, 7)\}$
 $x + 7 = 19$
 $x = 12$

32 $0.1x + 0.06y = 9$ multiply by $.09$

$$\begin{array}{r} 0.1x + 0.06y = 9 \\ 0.09x + 0.5y = 52.7 \text{ multiply by } -0.1 \\ \hline 0.009x + 0.0054y = 0.81 \\ -0.009x - 0.05y = -5.27 \\ \hline -0.446y = -4.46 \\ y = 100 \text{ plug into} \\ 0.09x + 0.5(100) = 52.7 \\ x = 30 \end{array}$$

$\{(30, 100)\}$

33 $x + y = 1200$

$$\begin{array}{r} 0.12x + 0.09y = 120 \text{ multiply by } 100 \\ x + y = 1200 \text{ } \times -12 \\ \hline 12x + 9y = 12000 \\ -12x - 12y = -14400 \\ \hline 12x + 9y = 12000 \\ \hline 0x - 3y = -2400 \\ y = 800 \\ \text{plug into } x + y = 1200 \\ x = 400 \end{array}$$

$\{(400, 800)\}$

34 $x - y = 100$ mult. 20

$$\begin{array}{r} 0.20x + 0.06y = 150 \text{ mult } -100 \\ 20x - 20y = 2000 \\ -20x - 6y = -15000 \\ \hline 0x - 26y = -13000 \\ y = 500 \text{ use } x - y = 100 \\ x = 600 \end{array}$$

$\{(600, 500)\}$

35 $1.5x - 2y = -0.25$ mult. -2

$$\begin{array}{r} 3x + 1.5y = 6.375 \\ -3x + 4y = .5 \\ \hline 3x + 1.5y = 6.375 \\ \hline 0x + 5.5y = 6.875 \\ y = 1.25 \\ \text{use first } 1.5x - 2(1.25) = -0.25 \\ x = 1.5 \end{array}$$

$\{(1.5, 1.25)\}$

36 X