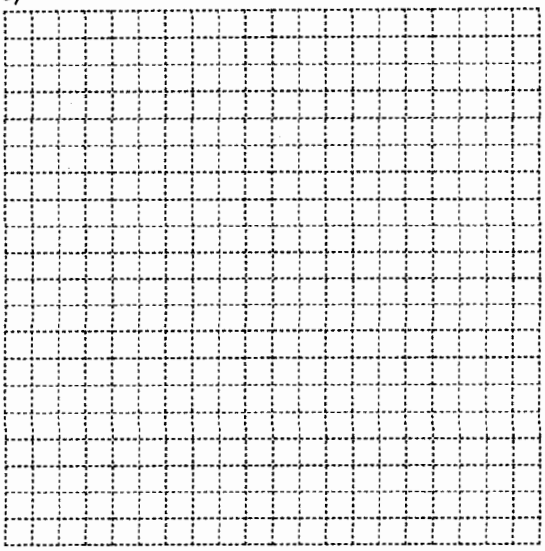
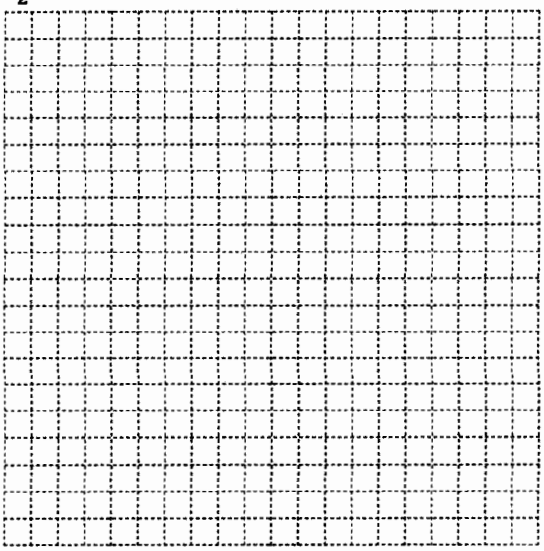
Math 72: Selected Review Chapters 3-4

1) Given the equation $\frac{2}{5}x - \frac{3}{5}y = \frac{6}{5}$
   a. Find the x-intercept(s)
   b. Find the y-intercept(s)
   c. Graph the equation.



2) Given the system of equations $\begin{cases} \frac{2}{5}x - \frac{3}{5}y = \frac{6}{5} \\ y = -\frac{3}{2}x + 11 \end{cases}$



   a. Solve the system by graphing.
   b. What is the special relationship between these two graphs?
   c. Solve the system by substitution.
   d. Solve the system by elimination.

3) Solve the system $\begin{cases} 3x - 2y + z = -11 \\ -5x + 3y - 2z = 16 \\ 2x - 5y + 3z = 9 \end{cases}$

4) A store sells tents, sleeping bags, and camp stools. A customer buys a tent, 5 sleeping bags, and 3 camp stools for $263. The price of the tent is 6 times the cost of a camp stool. The cost of a sleeping bag is $33 more than the cost of a camp stool. Find the cost of each item.

M72 Selected Review Exercises Chapters 3-4

① $\frac{2}{5}x - \frac{3}{5}y = \frac{6}{5}$ mult all by 5

$2x - 3y = 6$ much better!

a) x intercepts ⇒ set $y = 0$

$2x - 3(0) = 6$

$2x = 6$

$x = 3$ $\boxed{(3,0)}$

b) y-intercepts ⇒ set $x = 0$

$2(0) - 3y = 6$

$-3y = 6$

$y = -2$ $\boxed{(0,-2)}$

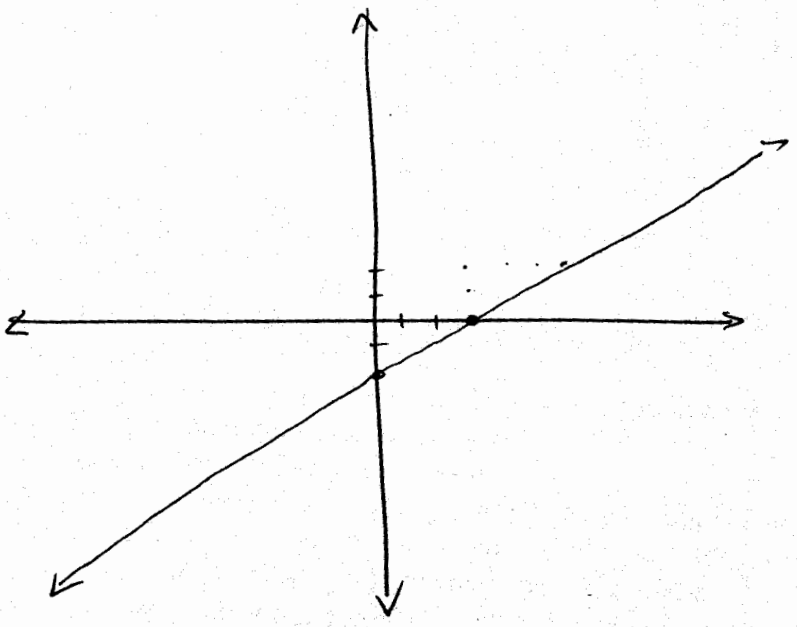
c) $2x - 3y = 6$

$-3y = -2x + 6$

$y = \frac{-2}{-3}x + \frac{6}{-3}$

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

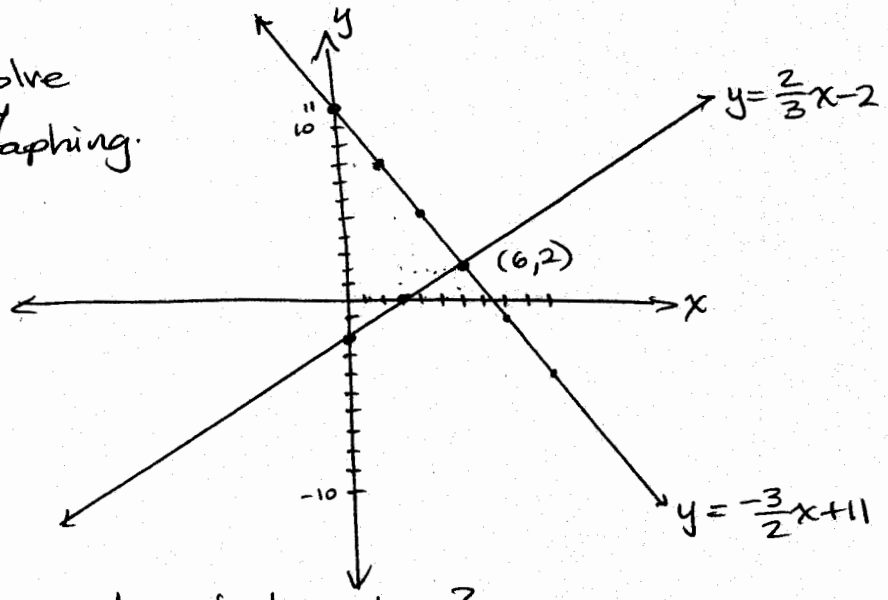
Graph using intercepts or $y = mx + b$



(2) $\begin{cases} \frac{2}{5}x - \frac{3}{5}y = \frac{6}{5} \\ y = -\frac{3}{2}x + 11 \end{cases}$ ⇐ same equation as (1)

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

a) Solve by graphing.



intersection (6,2)

b) special relationship?

$m = \frac{2}{3}$ vs $m = -\frac{3}{2}$ means they're **perpendicular**

c) substitution.

$\frac{2}{5}x - \frac{3}{5}y = \frac{6}{5} \Rightarrow 2x - 3y = 6$

$y = -\frac{3}{2}x + 11$

$2x - 3\left(-\frac{3}{2}x + 11\right) = 6$ subst

$2x + \frac{9}{2}x - 33 = 6$ dist

$\frac{13}{2}x = 39$ mult by reciprocal

$x = \cancel{39}^{3} \cdot \frac{2}{\cancel{13}}$

$x = 3 \cdot 2$

$x = 6$

$y = -\frac{3}{\cancel{2}}(\cancel{6}^{3}) + 11$

$= -9 + 11$

$= 2$

(6,2)

d) elimination

$\frac{2}{5}x - \frac{3y}{5} = \frac{6}{5} \Rightarrow 2x - 3y = 6$ (A) $\times 3$

$y = -\frac{3}{2}x + 11$

$2y = -3x + 22$

$3x + 2y = 22 \Rightarrow 3x + 2y = 22$ (B) $\times (-2)$

$$\begin{array}{r} 6x - 9y = 18 \\ -(6x - 4y = -44) \\ \hline -13y = -26 \end{array}$$

$y = 2$

$3(x) + 2(2) = 22$

$3x + 4 = 22$

$3x = 18$

$x = 6$

$\boxed{(6,2)}$

(3) $\begin{cases} 3x-2y+z=-11 & (A) \\ -5x+3y-2z=16 & (B) \\ 2x-5y+3z=9 & (C) \end{cases}$

use all 3 equations, eliminate the same variable twice.

I choose to eliminate z.

(A) x2 + (B) 1st pair

(A) x -3 + (C) 2nd pair

(A) x2 $\quad 6x-4y+2z=-22$

(B) $\quad -5x+3y-2z=16$

$x-y=-6$ (D) $x-y=-6$.

(A) x -3 $\quad -9x+6y-3z=33$

$2x-5y+3z=9$

$-7x+y=42$ (E) $-7x+y=42$

(D) $x-y=-6$

(E) $-7x+y=42$ } add (D) & (E) to eliminate y.

$-6x=36$

$x=-6$ $\Rightarrow$ (D) $-6-y=-6$

$-y=0$

$y=0$.

$x=-6$ and $y=0$ $\Rightarrow$ (A)

$3(-6)-2(0)+z=-11$

$-18+0+z=-11$

$z=7$

$\boxed{(-6,0,7)}$

Another way to do ③:

$$\begin{cases} 3x - 2y + z = -11 & (A) \\ -5x + 3y - 2z = 16 & (B) \\ 2x - 5y + 3z = 9 & (C) \end{cases}$$

solve (A) for z. subst $\Rightarrow$ (B)
subst $\Rightarrow$ (C)

$3x - 2y + z = -11$

$z = -3x + 2y - 11$

$\Rightarrow$ (B)

$-5x + 3y - 2(-3x + 2y - 11) = 16$

$-5x + 3y + 6x - 4y + 22 = 16$

$x - y + 22 = 16$

$x - y = -6$ (D)

$\Rightarrow$ (C)

$2x - 5y + 3(-3x + 2y - 11) = 9$

$2x - 5y - 9x + 6y - 33 = 9$

$-7x + y - 33 = 9$

$-7x + y = 42$ (E)

$x - y = -6$ (D)
$-7x + y = 42$ (E)
} add (D) & (E) to eliminate y.

$-6x = 36$

$x = -6$ $\Rightarrow$ (D) $-6 - y = -6$

$-y = 0$

$y = 0$.

$x = -6$ and $y = 0$ $\Rightarrow$ (A)

$3(-6) - 2(0) + z = -11$

$-18 + 0 + z = -11$

$z = 7$

$\boxed{(-6, 0, 7)}$

④ cost of a tent = T

cost of a sleeping bag = B

cost of a camp stool = C.

3 unknown costs (prices) ⇒ need 3 equations.

one tent + 5 sleeping bags + 3 camp stools = $263

$$T + 5B + 3C = 263 \quad (A)$$

tent = 6 · (camp stool)

$$T = 6C \quad (B)$$

sleeping bag = 33 + camp stool.

$$B = 33 + C \quad (C)$$

system of 3 equations.

$$\begin{cases} T + 5B + 3C = 263 & (A) \\ T = 6C & (B) \\ B = 33 + C & (C) \end{cases}$$

substitute (B) and (C) into (A):

$$(6C) + 5(33 + C) + 3C = 263$$

$$6C + 165 + 5C + 3C = 263$$

$$14C + 165 = 263$$

$$14C = 98$$

C = $7 for a camp stool

T = 6(C) means **T = 6(7) = $42 for a tent**

B = 33 + C means **B = 33 + 7 = $40 for a sleeping bag**

(These folks haven't bought camping equipment recently.)