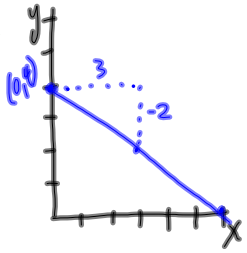
Graph: $2x + 3y = 12$

Option 1 $\Rightarrow$ $y = mx + b$

Option 2 $\Rightarrow$ x+y intercepts




① $2x + 3y = 12$

$3y = -2x + 12$

$y = \frac{-2}{3}x + 4$

m b

② $2x + 3y = 12$

x-intercept: $(y=0)$

$2x + 3(0) = 12$

$2x = 12$

$x = 6$ $(6,0)$

y-intercept: $(x=0)$

$2(0) + 3y = 12$

$3y = 12$

$y = 4$ $(0,4)$

Graph: $5x + 10y + 4z = 50$

x-intercept: $(y=0, z=0)$ $5x + 10(0) + 4(0) = 50$

$5x = 50$

$x = 10$ $(10,0,0)$

y-intercept: $(x=0, z=0)$ $5(0) + 10y + 4(0) = 50$

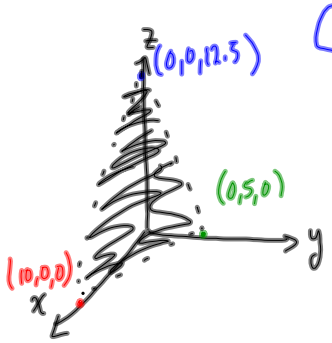
$10y = 50$

$y = 5$ $(0,5,0)$

z-intercept: $(x=0, y=0)$ $5(0) + 10(0) + 4z = 50$

$4z = 50$

$z = 12.5$ $(0,0,12.5)$



Solve: $-7(x+2y=4)$ → $-7x-14y=-28$

$7x+8y=25$ → $7x+8y=25$

$-6y=-3$

$y=\frac{-3}{-6}$

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

How:
1. graphing
2. substitution
3. elimination ✓
4. matrices.

$x+2y=4$

$x+2\left(\frac{1}{2}\right)=4$

$x+1=4$

$x=3$

$\left(3, \frac{1}{2}\right)$

Solve: $2x+y+4z=9$ → $2x+y+4z=9$

$3x+6z=11+y$ → $3x-y+6z=11$

$5x+3y=17+2z$ → $5x+3y-2z=17$

* Check first to see if you need to rearrange!!

$$\begin{bmatrix} 2 & 1 & 4 \\ 3 & -1 & 6 \\ 5 & 3 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix}=\begin{bmatrix} 9 \\ 11 \\ 17 \end{bmatrix}$$

coefficient matrix — variable matrix

```
[A]^-1[B]
          [[3  ]
           [1  ]
           [.5]]
```

$[A][X]=[B]$

$[X]=[A]^{-1}[B]$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix}=\begin{bmatrix} 3 \\ 1 \\ 1/2 \end{bmatrix}$$

$\therefore x=3, y=1, z=\frac{1}{2}$

Suzan is trying to determine the per minute cost of her cell phone time. She has reviewed 4 monthly bills:

| | # daytime min | # local night min | # long distance | Total |
|---|---|---|---|---|
| month 1 | 200 | 500 | 100 | $30 |
| month 2 | 250 | 600 | 20 | $26.50 |
| month 3 | 170 | 400 | 30 | $19.50 |
| month 4 | 100 | 700 | 50 | $24.00 |

Let D be the cost per minute (daytime)
N be the cost per minute (nightime)
L be the cost per minute (long dis)

$$200D + 500N + 100L = 30$$

$$\begin{bmatrix} 250D + 600N + 20L = 26.50 \\ 170D + 400N + 30L = 19.50 \\ 100D + 700N + 50L = 24.00 \end{bmatrix}$$

only need 3 eq for 3 unknowns

Write a matrix equation:

$$\begin{bmatrix} 250 & 600 & 20 \\ 170 & 400 & 30 \\ 100 & 700 & 50 \end{bmatrix} \begin{bmatrix} D \\ N \\ L \end{bmatrix} = \begin{bmatrix} 26.50 \\ 19.50 \\ 24.00 \end{bmatrix}$$

$$[A][X] = [B]$$

$$[X] = [A]^{-1}[B]$$

5¢/min → daytime min
2¢/min → nightime min
10¢/min → long dist.

$$\begin{bmatrix} D \\ N \\ L \end{bmatrix} = \begin{bmatrix} 0.05 \\ 0.02 \\ 0.10 \end{bmatrix}$$

You run a snow removal company + offer the following packages:

| | seasonal rate | per snowfall | Equations |
|---|---|---|---|
| A | $350 | – | $y = 350$ |
| B | $100 | $20 | $y = 20x + 100$ |
| C | $200 | $15 | $y = 15x + 200$ |

Which plan will make you the most money?

x is the # of snowfalls
y is total cost.

Find out when the plans cost the same:

**A + B**

$350 = 20x + 100$

$250 = 20x$

$x = 12.5$

$y = 350$

**B + C**

$20x + 100 = 15x + 200$

$5x = 100$

$x = 20$

$y = 500$

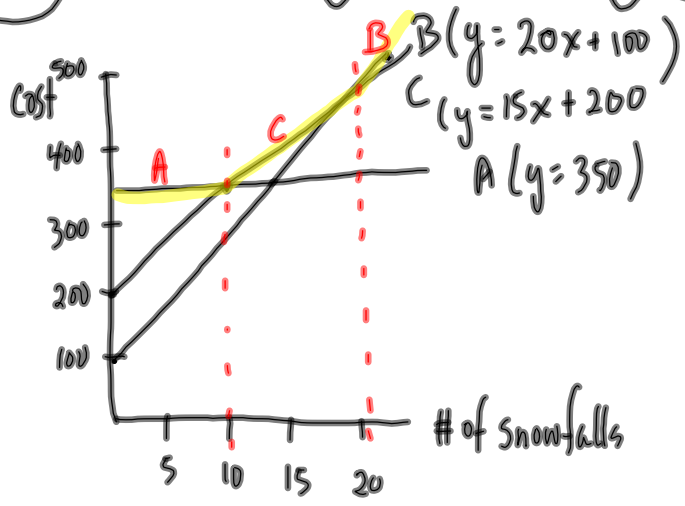
**A + C**

$350 = 15x + 200$

$150 = 15x$

$x = 10$

$y = 350$




A is best for less than 10 snowfalls

B is best for between 10 and 20 snowfalls

C is best for more than 20 snowfalls.

You want to prepare 2 bouquets from roses, Carnations + lilies:

| | Roses | Carnations | Lilies |
|---|---|---|---|
| 1st Bouquet | 6 | 7 | 5 |
| 2nd Bouquet | 8 | 6 | 4 |

Roses cost $4, Carnations cost $2.50 and lilies are $5

How much does each bouquet cost?

$$\begin{pmatrix} 6 & 7 & 5 \\ 8 & 6 & 4 \end{pmatrix} \begin{pmatrix} 4 \\ 2.50 \\ 5 \end{pmatrix} = \begin{pmatrix} 6\cdot4 + 7\cdot2.50 + 5\cdot5 \\ 8\cdot4 + 6\cdot2.50 + 4\cdot5 \end{pmatrix}$$

$2 \times 3$ match $3 \times 1$

$2 \times 1$

$$= \begin{pmatrix} 24 + 17.50 + 25 \\ 32 + 15 + 20 \end{pmatrix}$$

On calculator:

$$= \begin{pmatrix} 66.50 \\ 67 \end{pmatrix} (2 \times 1)$$

$$[A][B] = \begin{pmatrix} 66.50 \\ 67 \end{pmatrix} \begin{matrix} \leftarrow \text{The first bouquet} \\ \leftarrow \text{The second bouquet.} \end{matrix}$$

TOTAL COST $66.50 + 67 = \$133.50$