

Notes - Modeling, Problem-Solving + Systems


To help you solve

1. Find important information from Q
2. Define variables
3. Set-up equations / translate

System of Equations - More than one variable

→ You need as many equations as you have variables

3 Methods of Solving

1. Graphing - lines intersect 
2. Substitution - plug in the value of one variable in terms of another
3. Elimination - added eq. together to cancel out a variable
4. Matrix

Ex 1: In my bag of candy there were 300 pieces of either Jolly Ranchers or Laffy Taffy. There were four times as many J.R. as L.T.
How many J.R. did I get?

$j = \#$ of jolly ranchers $L = \#$ of Laffy Taffy

$$j + L = 300$$

$$j = 4L$$

$$4L + L = 300$$

$$\frac{5L}{5} = \frac{300}{5}$$

$$L = 60$$

$$j = 4(60)$$

$$= \underline{\underline{240 \text{ jolly ranchers}}}$$

Use
substitution

Ex 2: The sum of 2 numbers is 80.
 The difference of the numbers is 4.
 What is the smaller number?

Elimination

$$\begin{array}{r}
 a + b = 80 \\
 + \quad a - b = 4 \\
 \hline
 2a = 84 \\
 \frac{2a}{2} = \frac{84}{2} \\
 a = 42
 \end{array}$$

$$\begin{array}{r}
 42 - b = 4 \quad 42 + b = 80 \\
 \hline
 b = 38
 \end{array}$$

Ex 3: $x + y = 2200$ $\begin{bmatrix} 1 & 1 & 2200 \\ 1.5 & 4 & 5500 \end{bmatrix}$
 $1.5x + 4y = 5500$

- Before you put eqs. in the matrix, make sure that your columns each represent one variable.

On Calc $\boxed{2^{nd}} \boxed{X^{-1}}$ (Matrix)

Edit + enter your matrix

Quit ($\boxed{2^{nd}}$ \boxed{MODE})
 $\boxed{2^{nd}} \boxed{X^{-1}}$ $\boxed{\blacktriangleright}$ Calc

B: rref (enter)

$\boxed{2^{nd}} \boxed{X^{-1}}$ select the matrix you edited

Enter

$$\begin{bmatrix} 1 & 0 & 1500 \\ 0 & 1 & 700 \end{bmatrix} \Rightarrow \begin{cases} 1x + 0y = 1500 \\ 0x + 1y = 700 \end{cases} \Rightarrow \begin{cases} 1500 \text{ children} \\ 700 \text{ adults} \end{cases}$$