

Set up and solve the following word problem:

Zelda has \$8,900 to invest. She decides to invest all of her money in three different funds.

- The PX Company costs \$50 per share and pays dividends of \$1.00 per share each year.
- The NY Company costs \$90 per share and pays dividends of \$2.00 per share each year.
- The LZ Company costs \$40 per share and pays dividends of \$1.60 per share per year.

Zelda wants to invest half as much money in the LZ Company as in the NY Company and wants to earn \$222 in dividends per year. How many shares of each company should Zelda buy to meet her goal?

$x = \# \text{ of sh of PX}$

$y = \# \text{ of sh of NY}$

$z = \# \text{ of sh of LZ}$

She should buy 70 shares of PX, 40 shares of NY, and 45 shares of LZ.

$$50x + 90y + 40z = 8900$$

$$x + 2y + 1.6z = 222$$

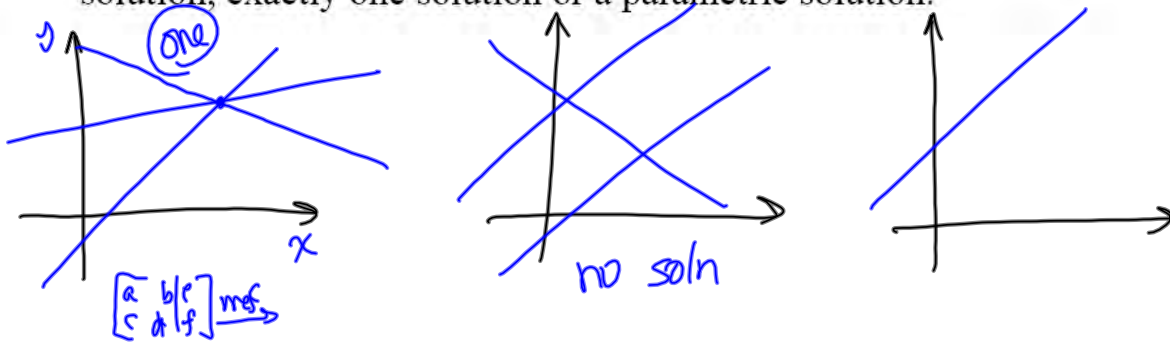
$$90y = 2(40z)$$

$$\text{or } \frac{1}{2}(90y) = 40z$$

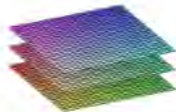


Number of Solutions Theorem

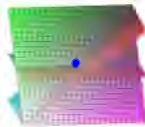
If the number of equations in a system of linear equations is equal to or greater than the number of variables, the system may have no solution, exactly one solution or a parametric solution.



No soln



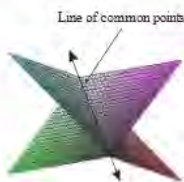
one soln (x,y,z)



parametric



If the number of equations in a system of linear equation is less than the number of variables, then the system may have no solution or a parametric solution



$(x, y, z) = (120 - 11t, 4t - 50, t)$, where t is

$t \in \mathbb{R}$
 Any Real Number
 $t \in \text{any } \mathbb{R}$

h. A particular solution (or specific solution) to the system is obtained by choosing a particular value for the parameter, t . For example, the specific solution corresponding to $t = 0$ is

$(x, y, z) = (120 - 11(0), -50 + 4(0), (0)) = (120, -50, 0)$

Find the specific solution corresponding to $t = 1$. (, ,)

Find any other specific solution to the system.

Your value of t : $-\frac{2}{3}$ or 2π or $\frac{1}{4}$ or ...

Your specific solution: (, ,)

Is (10, 10, 10) a specific solution to the system? **(A) Yes (B) No**

A company is buying three kinds of vehicles. Carts hold 3 people and cost \$9,000, vans hold 8 people can cost \$27,000 and minivans hold 7 people and cost \$27,000. The company needs to seat 48 people and has \$162,000 to purchase vehicles. How many of each type of vehicle can be purchased?

$x = \# \text{ of carts}$ $9000x + 27000y + 27000z = 162,000$
 $y = \# \text{ of vans}$ $3x + 8y + 7z = 48$
 $z = \# \text{ of minivans}$

$\left[\begin{array}{ccc|c} 9000 & 27000 & 27000 & 162000 \\ 3 & 8 & 7 & 48 \end{array} \right] \xrightarrow{\text{ref}} \left[\begin{array}{ccc|c} \textcircled{1} & 0 & -3 & 0 \\ 0 & \textcircled{1} & 2 & 6 \end{array} \right]$

$x - 3t = 0$
 $y + 2t = 6$
 $z = t$

$(x, y, z) = (3t, 6 - 2t, t)$ where $t = \# \text{ of vans}$

What is the lowest value for t ? **CLICKER**

$t=0$	$(0, 6, 0)$	0 carts	6 vans	0 minivans
$t=1$	$(3, 4, 1)$	3	4	1
$t=2$	$(6, 2, 2)$	6	2	2
$t=3$	$(9, 0, 3)$	Buy 9 carts, 0 vans, and 3 minivans		

There are 4 solns