2nd lesson

Theory

Remarks 1.   1. Find the echelon row form of a matrix.

2. Is there zero variables, which are equal to a nonzero number? $\longrightarrow$ No solution.

3. Is there zero variables, which are equal to zero? $\longrightarrow$ Infinitely many solutions. Then fix one (or more) variables and then compute the others.

Exercises

1. Solve the following systems of equations:

(a)
$$x - 3y = 4$$
$$\tfrac{1}{2}x - \tfrac{3}{2}y = 2$$

(b)
$$x + 3y = 2$$
$$-3x - 9y = 1$$

(c)
$$2x + 4y = 10$$
$$3x + 6y = 17$$

2. Solve the following systems of equations:

(a)
$$x + 2y - 3z = -2$$
$$3x - y - 2z = 1$$
$$2x + 3y - 5z = -3$$

(b)
$$x + y + z = 1$$
$$3x - y - z = 4$$
$$x + 5y + 5z = -1$$

(c)
$$x + y + 3z = 0$$
$$x + 3y + 5z = 0$$
$$2x + 4z = 1$$

(d)
$$x - 2y + 3z = 1$$
$$x + y - 3z = 7$$
$$3x - 4y + 5z = 7$$

(e)
$$2x + 4y + 4z = 2$$
$$3x + 4y + 2z = 5$$
$$5x + 8y + 6z = 4$$

(f)
$$x + 9y - z = 27$$
$$x - 8y + 16z = 10$$
$$2x + y + 15z = 37$$

(g)
$$2x - 4y + z = -4$$
$$4x - 8y + 7z = 2$$
$$-2x + 4y - 3z = 5$$

(h)
$$3x + 6y - 9z = 15$$
$$2x + 4y - 6z = 10$$
$$-2x - 3y + 4z = -6$$

3. Solve the following systems of equations:

(a)
$$x + 2y = 4$$
$$x - 2y = 0$$
$$4x + 3y = 12$$

(c)
$$x - 2y + 4z = 2$$
$$2x + y - 2z = -1$$
$$3x - y + 2z = 1$$
$$2x + 6y - 12z = -6$$

(b)
$$w + x + 2y - 3z = -2$$
$$-4w + 3x - y - 2z = 1$$
$$w + 2x + 3y - 5z = -3$$

(d)
$$-w + x - y + z = 2$$
$$w + x - y + z = 0$$
$$4x - 4y + 4z = 4$$
$$w - 2x + 2y - 2z = -3$$

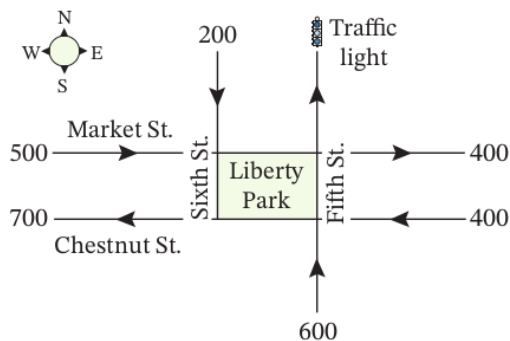4. Choose an image and find a system of 3 equations, which can be represented by your image. Repeat twice more.
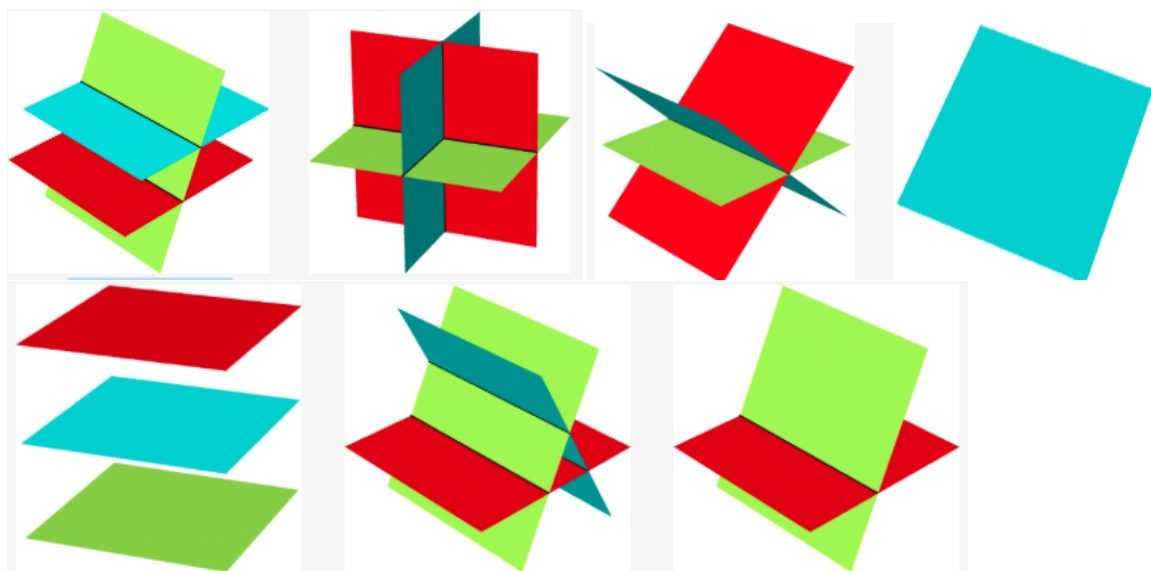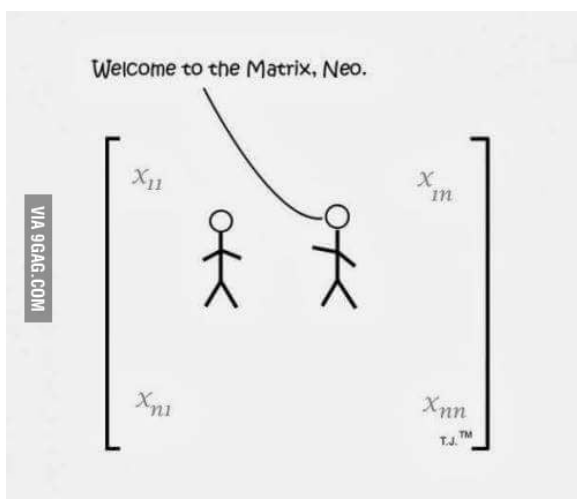
5. The network shows a plan for the traffic flow around a new park. The plan calls for a computerized traffic light at the north exit. The diagram indicates the average number of vehicles per hour that are expected to flow in and out of the streets around the park. All streets are one-way.

   (a) How many vehicles per hour should the traffic light let trough? The average number of vehicles flowing into is the same as the average number of vehicles flowing out.

(b) What can you say about the average number of vehicles per hour that will flow along the streets that border the park?

Welcome to the Matrix, Neo.

$$\begin{bmatrix} x_{11} & & x_{1n} \\ & & \\ x_{n1} & & x_{nn} \end{bmatrix}$$

https://9gag.com/gag/aPGPoNn/welcome-to-the-matrix-neo