

## 6.6) Solving systems of equations using matrices

## Worked example

Solve the simultaneous equations:

$$6x - y + 2z = 6$$

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

$$2x - 3y - 5z = 24$$

## Your turn

Solve the simultaneous equations:

$$-x + 6y - 2z = 21$$

$$6x - 2y - z = -16$$

$$-2x + 3y + 5z = 24$$

$$x = -1, y = 4, z = 2$$

## Worked example

A llama farmer has three types of llama: woolly, classic and Suri. Initially his flock had 2810 llamas in it. There were 160 more woolly llamas than classic.

After one year:

- The number of woolly llamas had increased by 5%
- The number of classic llamas had increased by 3%
- The number of Suri llamas had decreased by 4%
- Overall the flock size had increased by 46

Form and solve a matrix equation to find out how many of each type of llama there were in the initial flock.

## Your turn

A colony of 1000 mole-rats is made up of adult males, adult females and youngsters. Originally there were 100 more adult females than adult males.

After one year:

- The number of adult males had increased by 2%
- The number of adult females had increased by 3%
- The number of youngsters had decreased by 4%
- The total number of mole-rats had decreased by 20

Form and solve a matrix equation to find out how many of each type of mole-rat were in the original colony.

**100 adult males, 200 adult females, 700 youngsters in the original colony**

## Worked example

The system of equations is consistent and has a single solution. Determine the possible values of  $k$ .

$$x - 3y - 2z = 7$$

$$kx - y + 3z = 11$$

$$x - y + z = 13$$

## Your turn

The system of equations is consistent and has a single solution. Determine the possible values of  $k$ .

$$2x + 3y - z = 13$$

$$3x - y + kz = 11$$

$$x + y + z = 7$$

$$k \neq 15$$