

Some Exercises in Linear Algebra

1. Each of the following systems of equations has a unique solution. For the first system, there is exactly one value of x and one value of y which satisfy both equations simultaneously. Similarly, there is just one value of x , one value of y and one value of z which satisfy the second set of equations simultaneously. Can you find the solutions in each case?

(a) $x - y = 5$
 $3x + 2y = 10$

(b) $x - y + z = 6$
 $2x + y = 3$
 $x - 3z = -7$

2. Neither of the following systems has a solution. Can you prove this?

(a) $x - y = 5$
 $3x - 3y = 10$

(b) $x - y + z = 6$
 $2x - y - 2z = -2$
 $x - 3z = -7$

3. Each of the following systems has infinitely many solutions. In the first system, there are infinitely many values of x and corresponding values of y which satisfy both equations simultaneously. Similarly, there are infinitely many values of x , y and z which satisfy the second set of equations simultaneously. Can you find a way to describe the solutions in each case?

(a) $x - y = 5$
 $3x - 3y = 15$

(b) $x - y + z = 6$
 $-2x + y + 2z = 1$
 $x - 2y + 5z = 19$