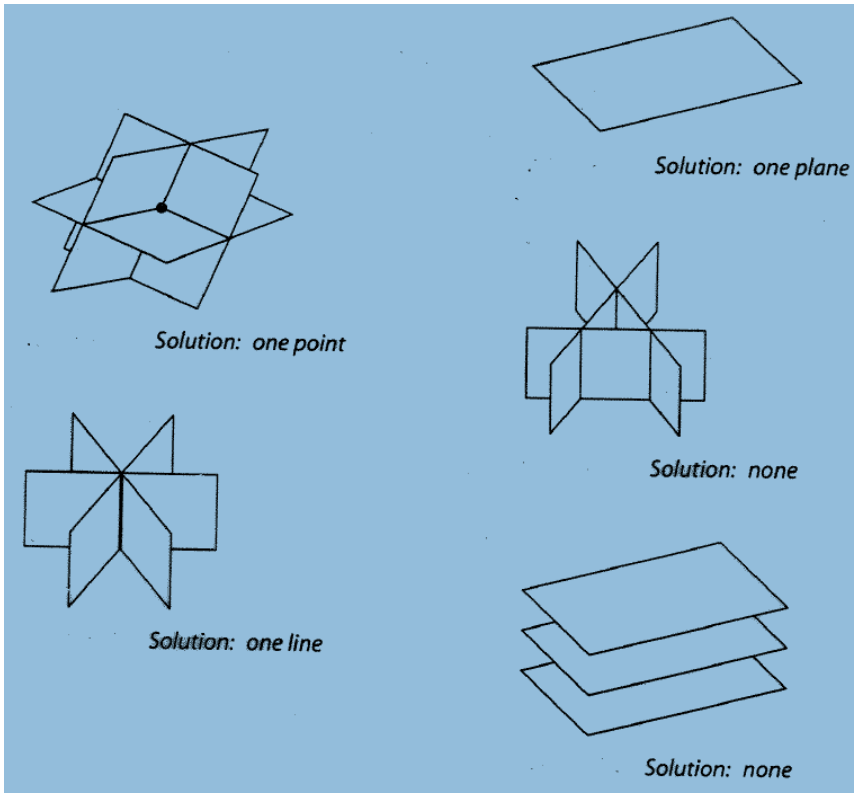
In section 7.3 you will learn to:

- Use back substitution to solve linear systems in row-echelon form.
- Use Gaussian elimination to solve systems of linear equations,
- Solve non-square systems of linear equations.
- Model and solve real-life problems by setting up systems of linear equations in three or more variables.

Multivariable linear systems

An equation with three variables represents what?

What are the possibilities for solutions to three equations in three unknowns?



Method of Gaussian Elimination -- You may:

- Exchange two rows.
- Multiply a row by a nonzero constant.
- Temporarily multiply a row by a nonzero constant, add it to another row and replace one of the rows with the result.

Example 1

$x - y + z = 4$

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

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

You may:
Exchange rows
Multiply row
Multiply row, add

Example 2 Solve

$$x - 2y + z = 4$$

$$3x - 6y + 3z = 7$$

$$2x + y + 4z = 2$$

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

$$2x + y + z = 5$$

Example 4

Find the equation of the parabola $y = ax^2 + bx + c$ that passes through the points (0,3), (1,4) and (2,3).