

# How can a system of equations be solved using Python?

Authored by  
**stats writer**

May 15, 2024

## RECOMMENDED CITATION

stats writer (2024). *How can a system of equations be solved using Python?*.

PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=144138>

A system of equations refers to a set of equations that are interconnected and need to be solved together. In order to solve a system of equations using Python, one can use various techniques such as substitution, elimination, or matrix methods. Python provides a variety of functions and libraries that allow for the efficient and accurate solving of equations. These functions can be used to input the equations, manipulate them, and find the solutions. By using Python, the process of solving a system of equations becomes more streamlined and less prone to errors. Additionally, Python also allows for the visualization of the solutions, making it easier to understand and analyze the results. Overall, Python provides a powerful and convenient tool for solving systems of equations, making it a valuable tool for mathematicians, scientists, and engineers.

## Solve a System of Equations in Python (3 Examples)

To solve a system of equations in Python, we can use functions from the library.

The following examples show how to use NumPy to solve several different systems of equations in Python.

### Example 1: Solve System of Equations with Two Variables

Suppose we have the following system of equations and we'd like to solve for the values of  $x$  and  $y$ :

$$5x + 4y = 35$$

$$2x + 6y = 36$$

The following code shows how to use NumPy to solve for the values of  $x$  and  $y$ :

```
import numpy as np  
  
#define left-hand side of equation  
left_side = np.array(, )  
  
#define right-hand side of equation  
right_side = np.array()  
  
#solve for x and y  
np.linalg.inv(left_side).dot(right_side)  
  
array()
```

**This tells us that the value for x is 3 and the value for y is 5.**

**Example 2: Solve System of Equations with Three Variables**

**Suppose we have the following system of equations and we'd like to solve for the values of x, y, and z:**

$$4x + 2y + 1z = 34$$

$$3x + 5y - 2z = 41$$

$$2x + 2y + 4z = 30$$

The following code shows how to use NumPy to solve for the values of x, y, and z:

```
import numpy as np

#define left-hand side of equation
left_side = np.array(, , ])

#define right-hand side of equation
right_side = np.array()

#solve for x, y, and z
np.linalg.inv(left_side).dot(right_side)

array()
```

This tells us that the value for x is 5, the value for y is 6, and the value for z is 2.

Example 3: Solve System of Equations with Four Variables

Suppose we have the following system of equations and we'd like to solve for the values of w, x, y, and z:

$$6w + 2x + 2y + 1z = 37$$

$$2w + 1x + 1y + 0z = 14$$

$$3w + 2x + 2y + 4z = 28$$

$$2w + 0x + 5y + 5z = 28$$

The following code shows how to use NumPy to solve for the values of w, x, y, and z:

```
import numpy as np

#define left-hand side of equation
left_side = np.array(, , , ])

#define right-hand side of equation
right_side = np.array()

#solve for w, x, y, and z
np.linalg.inv(left_side).dot(right_side)

array()
```

This tells us that the value for w is 4, x is 3, y is 3, and z is 1.

The following tutorials explain how to solve a system of equations using other statistical software: