

lineareqsoctave

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0.0.1 How to Solve a System of Linear Equations in *GNU Octave*

Let's have a look at the following system of linear equations:

$$\begin{array}{rcrcrcrcl} 2x & + & 5y & = & 33 \\ -3x & + & y & = & 10 \end{array}$$

Define the following two matrices (the single column matrices can also be called vectors and will be labeled by lower-case letters):

$$A = \begin{bmatrix} 2 & 5 \\ -3 & 1 \end{bmatrix}, b = \begin{bmatrix} 33 \\ 10 \end{bmatrix}$$

Let

$$z = \begin{bmatrix} x \\ y \end{bmatrix}$$

Then the system of linear equations is equivalent to the following equation:

$$A \cdot z = b$$

Left-multiply by A^{-1} for

$$\begin{bmatrix} x \\ y \end{bmatrix} = A^{-1} \cdot b$$

The solution vector z is simply the inverse of A multiplied by b . Let's define A in *GNU Octave*.

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In [1]: A=[2,5;-3,1]
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A =

```
 2    5
-3    1
```

Next we define b .

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In [2]: b=[33;10]
```

b =

33

10

Lastly, multiply A^{-1} by b and derive the solution.

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In [3]: z=inv(A)*b
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z =

-1.0000

7.0000

The result is $x = -1, y = 7$.