

# System of equations

Mathematical

problem  $y = x^2 + 2x$   
 $y = 12 - x^2$

$$y - x^2 - 2x = 0$$

$$y - 12 + x^2 = 0$$

A two-elements list

$[x, y]$

```
def system( unknowns ):
    x = unknowns[0]
    y = unknowns[1]
    eq1 = y - x**2 - 2*x
    eq2 = y - 12 + x**2
    return [eq1, eq2]
```

```
guess = [1, 1]
x0, y0 = fsolve(system, guess)
```

fsolve() return  
a two-elements list

$[x0, y0]$

Very simplified algorithm of  
finding the roots by fsolve() function

User defined  
function

Start

$[x, y] = \text{guess}$

$[x, y]$

```
def system( unknowns ):
    x = unknowns[0]
    y = unknowns[1]
    eq1 = y - x**2 - 2*x
    eq2 = y - 12 + x**2
    return [eq1, eq2]
```

try  
another  
x, y

check if eqs  $\approx 0$

no

yes

fsolve() body

$[x0, y0]$  the solution was found

End (return a list with the solutions)