

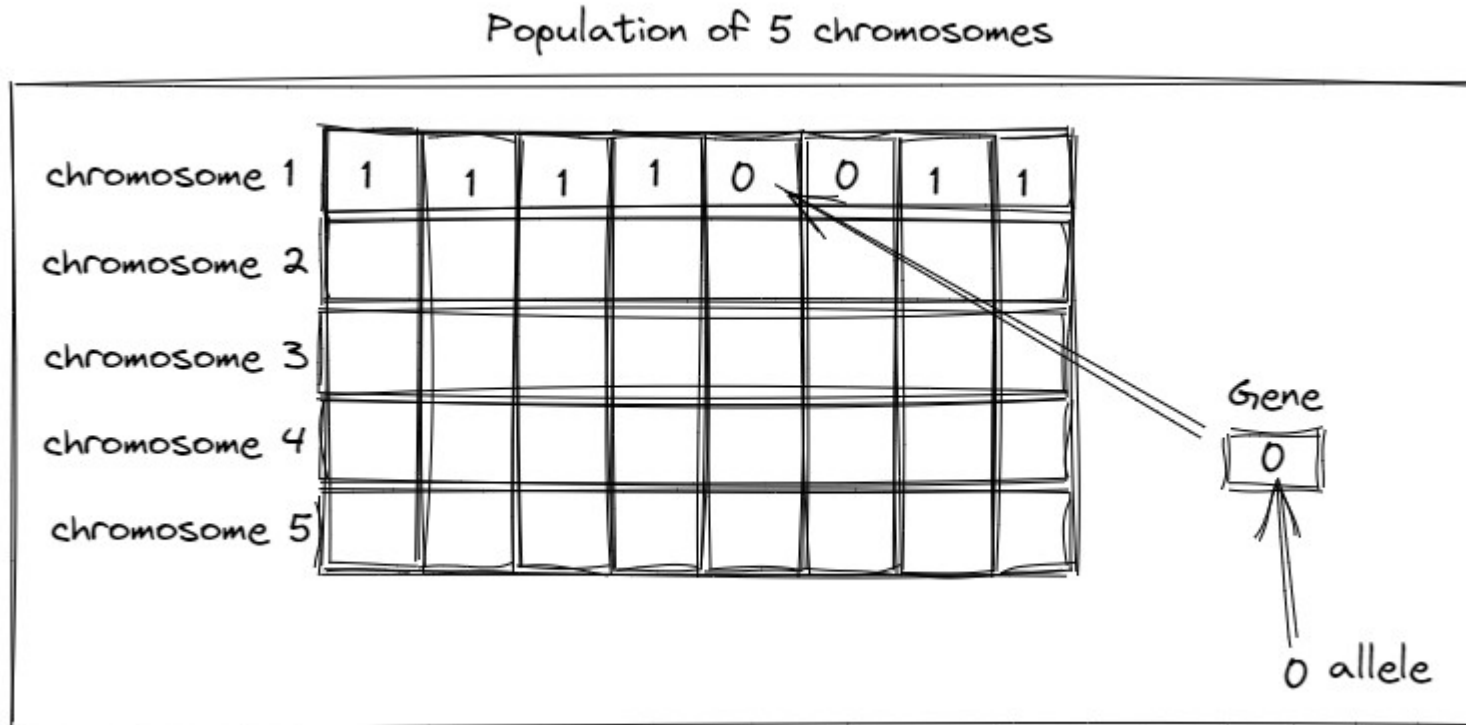
# Genetic algorithms

They SEARCH for a solution to maximize (minimize) a function.

There is no guarantee it will work. However, it is easy to use since is *free* of tedious math requirements.

# Example

- Chromosomes are the number of solutions that you want to try.
- Genes are the variables for each solution.



# What is a gene?

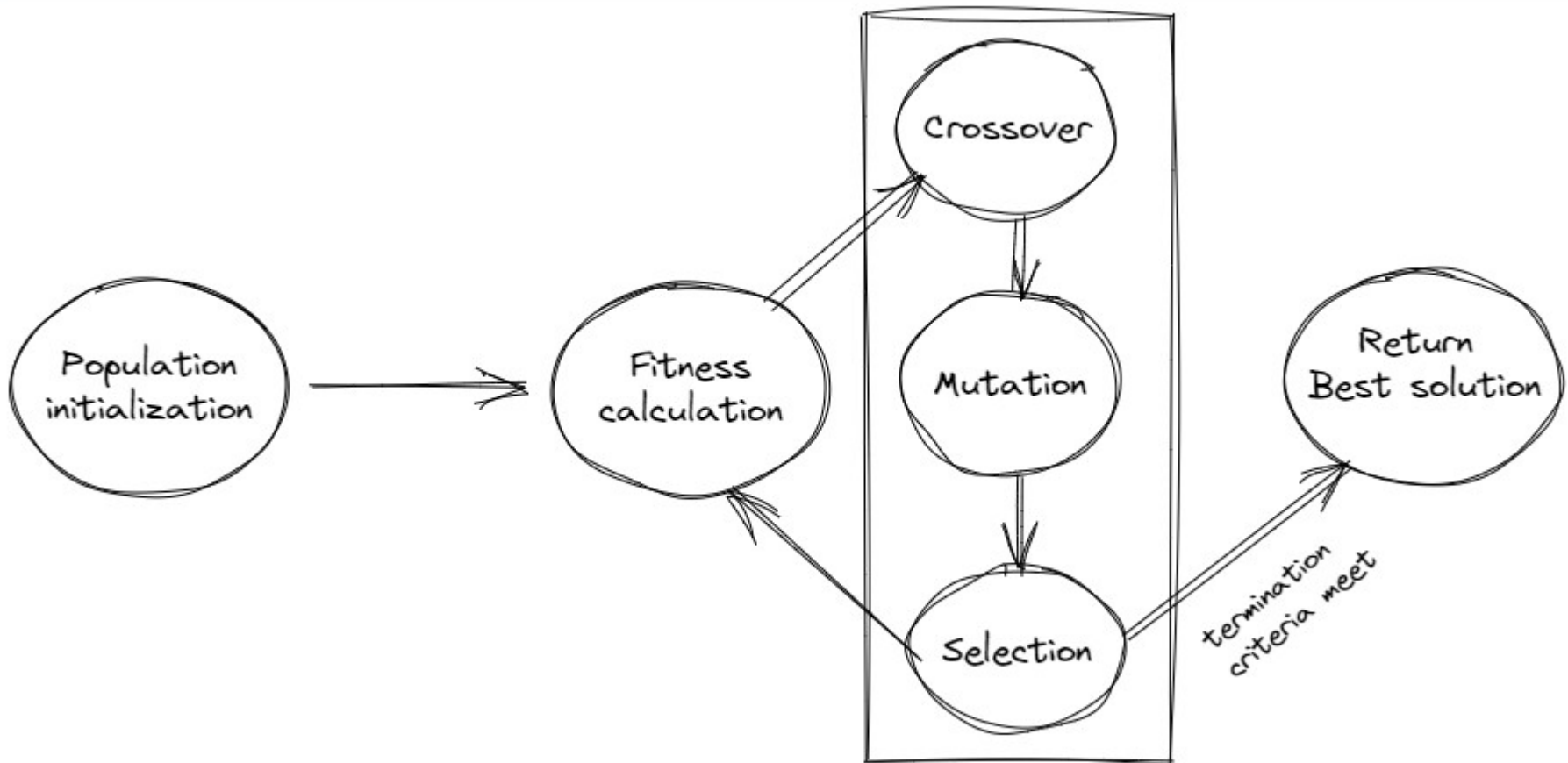
$$f(x_1, x_2) = x_1^2 + x_2^2$$

How many solutions you want to try = # chromosomes

How many genes? TWO:  $x_1$  and  $x_2$

# Overview

$$f(x_1, x_2) = x_1^2 + x_2^2$$



# Fitness calculation

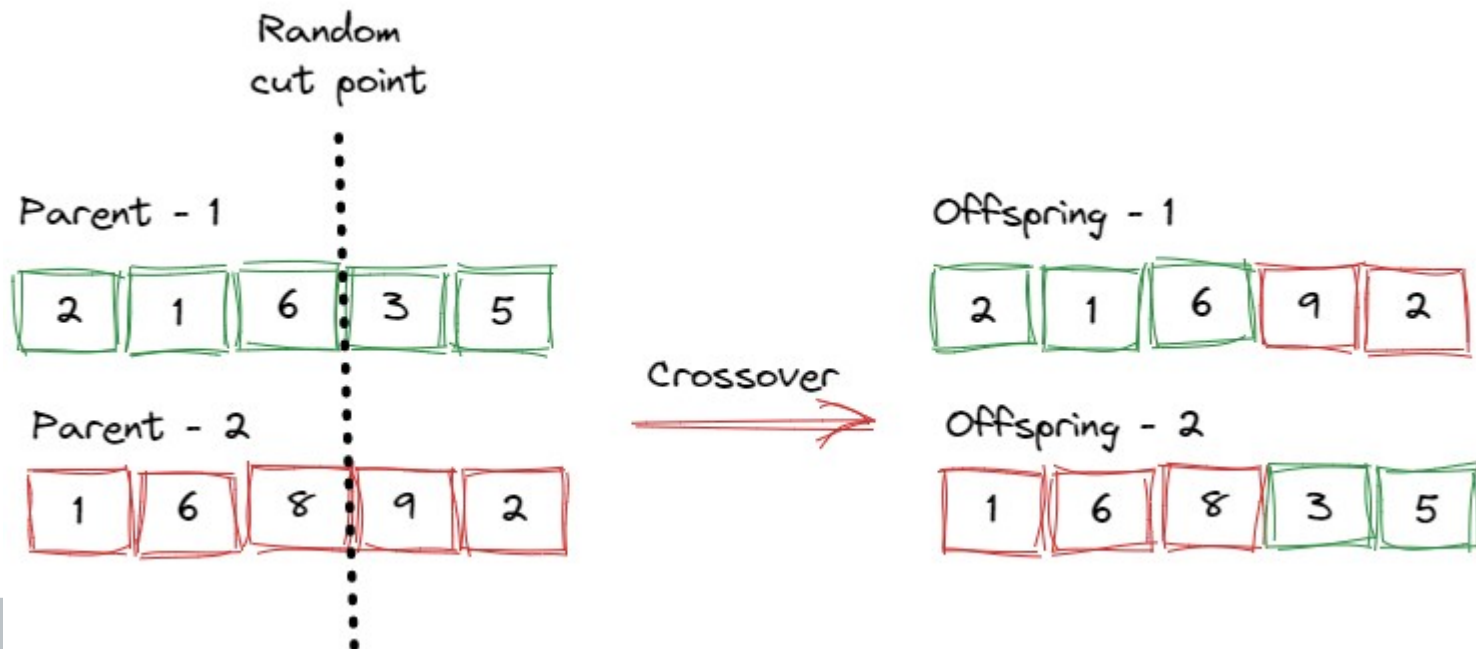
$$f(x_1, x_2) = x_1^2 + x_2^2$$

	$x_1$	$x_2$	
chromosome 1	2.5	3.12	fitness = 15.9844
chromosome 2	1.11	0.12	fitness = 1.2465
chromosome 3	1.123	1.41	fitness = 3.2492
chromosome 4	0.01	4.71	fitness = 22.1842
chromosome 5	4.4	1.22	fitness = 20.8484

# Crossover

From the # of chromosomes, we choose a # of parents, the rest will be the offspring.

We create the offspring by mixing the genes from the parents, and possibly we mutate the genes



# When do we stop?

## - Different criteria:

- By # of generations
- No change in the fitness function