

## Implementing Discrete Optimization Problem Using Genetic Algorithm

In this question, we aim to find the global maximum value of the function

$$f(x) = -x^2 + 6x$$

over the integer interval  $[0, 30]$  using a genetic algorithm. The desired solution involves implementing all parts of the algorithm without using existing genetic algorithm libraries.

To achieve this, we start by selecting a random population within the specified interval and continue the algorithm until a termination condition is met.

Your code should include separate implementations for generating the initial random population (with the input of population size), parent selection, survivor selection based on fitness, mutation, and recombination using single-point and uniform methods.

The program execution should allow receiving necessary inputs either from a file or from the console. These inputs should be received in separate lines and include population size, mutation probability, recombination probability, recombination type (1 for single-point and 2 for uniform), and the maximum number of iterations as the termination condition. There should be no need to manually change parameters within your code.