

PROBLEM 1

We are using a genetic algorithm to solve some problem. The current population includes 5 individuals with the fitness values f :

individual_ID	f
1	427
2	100
3	249
4	201
5	23

- determine their reproduction probabilities p_f , so that p_f is proportional to f
- determine their reproduction probabilities p_r , so that p_r is proportional to the rank of f
- select $N=10$ individuals for recombination using stochastic universal sampling. The individuals are ordered ascending by individual_ID. Assume that the random generator returned 0.5

PROBLEM 2

You are using a genetic algorithm to solve a discrete optimization problem. Your population consist of 8 individuals, with the following fitness:

$$f_1=9.8, f_2= 2.4, f_3=5, f_4=4.2, f_5=7.1, f_6=1.2, f_7=7.7, f_8=3.7$$

Single tournament selection randomly splits the population into small groups of size g . On two best agents from each group crossover is applied, and the descendants replace two worst agents in the group.

Simulate one step of single tournament selection, assuming that $g=4$ and that your random number generator returns the following sequence of numbers:

$$a_i = 1 + (i \bmod 8)$$

Form groups, select breeding and replacement individuals.