We create an *n*-digit number *target* that the GA is expected to guess. The GA is provided *n*.

Implement the following:
1. Selection sampling algorithm (Algorithm S in *Art of Computer Programming Volume 2* by Knuth)
   > To select *n* elements at random from a population of size N, $0 < n \leq N$
   > Step S1. *Set $t = 0$, $m = 0$*
   > Step S2. *Generate random U, uniformly distributed between 0 and 1*
   > Step S3. *If $(N - t) * U \geq n - m$, go to* Step S5.
   > Step S4. *Select the next element and increase m and t by 1. If $m < n$ go to* Step S2. *Otherwise, terminate.*
   > Step S5. *Skip the next element, increase t by 1, and go to* Step S2.
2. Shuffling algorithm (Algorithm P in *Art of Computer Programming Volume 2* by Knuth, attributed to Fisher and Yates (1938), Durstenfeld (1964))
   > To shuffle $x_1, \ldots, x_t$, a sequence of *t* numbers
   > Step P1. *Set $j = t$*
   > Step P2. *Generate random U, uniformly distributed between 0 and 1*
   > Step P3. *Set $k = floor(j * U) + 1$. Exchange x_k and x_j.*
   > Step P4. *Decrease j by 1. If $j > 1$, go to* Step P2
3. An appropriate fitness function calculator
   > Input is a chromosome from the GA and output is the appropriate fitness score. The GA should not be able to access any information about how the score is obtained.
4. Population initialization procedure
   > Choose an appropriate population size *N* and randomly create *N* chromosomes.
5. Roulette wheel selection algorithm
   > *Evaluate fitness score for each chromosome*
   > *Normalize all fitness scores*
   > *Sort normalized scores in descending order*
   > *Generate random number U, uniformly distributed between 0 and 1*
   > *Select first chromosome whose accumulated normalized fitness score is at least U*
   > *Repeat to select second parent*
   > *Repeat parent selection process as many times as desired*
6. Tournament selection (Option A)
7. Crossover functions
   a. One point
   b. Multiple point
   c. Uniform
8. Mutation functions
   a. Random reset
   b. Swap
   c. Scramble
   d. Inversion
9. Survivor selection method of your choice
10. Termination procedure of your choice