

CECS 451
Assignment 4
Total: 50 Points

General Instruction

- Submit your work in the Dropbox folder via BeachBoard (Not email or in class).
-

1. (30 points) Implement a n -queens problem solver by using a **genetic algorithm**.

- Use Python 3.7 and the name `n-queens.py`
- I strongly recommend you can follow the object-oriented programming style.
- Follow the specification
 - The program should take n value (# of queens) and k value (# of states) from `sys.argv`.
ex) `python n-queens.py 5 8`
 - The program should start a local search from randomly located n -queens.
 - The program should use the as **the number of nonattacking pairs** as the **fitness function**.
 - The program should perform the three operations, i.e., **selection**, **crossover**, **mutation** to find a solution. (Please refer Figure 4.6 in the text book.)
 - You will be asked to report your strategy of three operations.
 - The program should track the number of the three operations (let's say steps) during a search.
 - The program should output a solution and be terminated.
 - An expected output format. (Assume $n = 4$)
The number of the required steps: 3
- - X -
X - - -
- - - X
- X - -
- Submit your `n-queens.py`.

2. (20 points) Evaluate your n -queens problem solver.
 - i. Describe your strategy of the three operations.
 - ii. With some k value, repeat running your `n-queens.py` (set $n = 5$) 100 times and record 'the number of the required steps'.
 - iii. Draw a histogram and calculate descriptive statistics (i.e., average, median, min, max, etc).
 - iv. Include the histograms and the descriptive statistics in your report.
 - v. Submit your `n-queens_report.pdf`.