King Fahd University of Petroleum & Minerals
Information and Computer Science Department

ICS 381: Principles of Artificial Intelligence (Term 202)

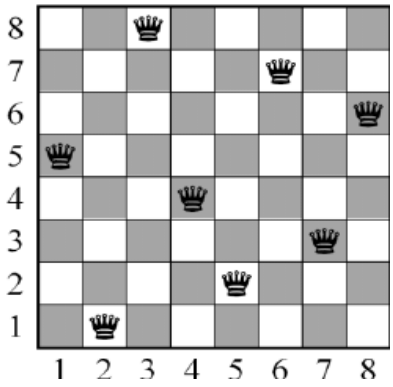
Programming Assignment #01 [Deadline: Feb. 20 before midnight]

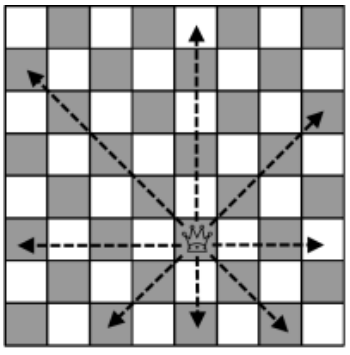
Notes and Submission Guidelines:

1. This homework is to be done by individual students (no group work) and should abide by the university academic integrity policy; cheating will result in severe penalty.
2. Submit a compressed file named HW2-ID.ZIP, where ID is your KFUPM ID; include the file source code PA1.py and a PDF containing sample outputs for testing the program execution under various conditions.
4. Only submissions through Blackboard before the deadline will be accepted. To avoid errors and follow a unified procedure, submissions are not accepted by emails or any other means for whatever reasons; so submit as early as possible to avoid technical problems at the last hour.
5. Failure to follow the above submission guidelines will be penalized.

Reading: Chapter 4 and 6

N-Queen puzzle is a problem in artificial intelligence. It consists of N Queens and N x N square grid (chessboard). The goal is to find a solution of placing all queens on the chessboard so that no two queens threaten each other (i.e. no two queens share the same row, column, or diagonal). It is required to develop a program in Python to compare to compare the performances of utilizing A* search and genetic algorithm search in solving this puzzles.





Develop a program Python with a GUI that shows the chessboard and list of algorithms implemented to solve the N-Queen Problem. The use selects one of the algorithms then clicks Run button to start solving the puzzle using the selected algorithm, where the steps of moving the queens on the chessboard are visually traced. Once a solution is

found, the program shows the number of steps and execution time. When the user clicks the Stop button, the program stops searching for a solution.

Since this assignment is for learning purpose, do not use exiting online solutions or packages for AI algorithms. However, you can packages for implementing the GUI. Use multiple classes and methods for each approach. For the genetic algorithm, allow the user to set the parameters and operations, e.g. population size, number of generations, crossover (single point, multi-point, crossover rate), mutation rate, recombination with/without elitism.

Assume any missing information and be creative. Follow good programming practices in writing clear and commented code.