# Evolutionary Computing (2023)

## Assignment (1):
8-Queens problem

Shiraz University

**Due date: 20/October (2023)**

# 1 Introduction

The N-queens problem was introduced in 1850 by Carl Gauss and has been studied for many decades by scientists. The 8-queens problem is an effort to find a placement of 8 queens on an 8 x 8 chess board so that no two queens attack each other. The queens should be placed on the chessboard in a way that these conflicts are minimized — no two queens should be in the same row, column, or diagonal.

In this assignment you'll have to implement an evolutionary solution for 8-queens problem. Apply GA with the following properties shown in Table 1 to this problem. Read the lecture slides for more details. Plot the maximum and average fitness **per each iteration** of algorithm for your result reports.

*Table 1: solution properties for 8-queens problem*

| | |
|---|---|
| **Representation** | Premutation |
| **Recombination** | 'Cut-and-Fill' crossover |
| **Recombination probability** | 100% |
| **Mutation** | Swap |
| **Mutation probability** | 80% |
| **Parent selection** | Best 2 out of random 5 |
| **Survival selection** | Replace worse: replace children with the 2 worse individuals in population. |
| **Population size** | 100 |
| **Number of offspring** | 2 |
| **Initialization** | Random |
| **Termination condition** | Solution or 10,000 fitness evaluations |

## Notes:

- Allowed programming languages: Python, MATLAB
- Any sign of cheating would result in a zero grade for this assignment.
- You should upload your submissions at:
  https://quera.org/course/add_to_course/course/14736/
  All of the files should be in a ZIP file named in this format: "Lastname-SudentNumber.zip"
  Ex: "Zamani-4023040.zip"
- Your reports should be in a PDF file including: key points of your implementation, reports of your final results and answers of assignment questions (if given).