ETGG 4803 ***Lab 5: Shakespeare and Queens***
50 points **Due: 8 March 2020**

Part I (25 points)
Follow the process in Lab 4 to implement a GA to create the phrase "*To be, or not to be, that is the question.*" The result should include correct capitalization, the commas, and the full stop.

1. Test three different fitness functions.
    a. Calculate the number of correct characters.
    b. Calculate the distance between an allele and the correct character in terms of the 54 available characters. If an allele is ten characters before the correct character for that position, the distance is -10. If the allele is four characters after the correct value, the distance is +4.
        i. The fitness score of a chromosome is the sum of the absolute values of these distances.
        ii. The fitness score of a chromosome is the sum of the (signed) values of these distances.
2. For each fitness function, modify the various parameters of the GA to converge as quickly as possible to the desired phrase. Write a clear report in which you explain the results as well as which parameters you chose and why. (Parameters include population size, parent, crossover, mutation, and survivor selection methods, and termination procedure.)

Part II (25 points)
Using the problem representation from class, follow the process in Lab 4 to implement a GA to find solutions to the *n Queens* problem in which we attempt to place *n* Queens on an *n*-by-*n* chessboard so that no Queens attack each other. The GA receives the value *n* and returns the best solution it can find for the problem.

Write a clear report with the results of the GA for $n = 2, \ldots, 10$. Clearly explain which parameters you chose and why. Be sure to include an explanation of your fitness function.