CISC471 - Homework 2

Due Friday, February 5, 2021 at 5:00PM EST

Submission

Please submit the programming and theory as multiple files in OnQ. The programming component should be submitted as a Python3 program with the main file `main.py` and any other python files you wish. The theory component should be submitted as a single PDF file. These should be done in groups of either one or two people. In your PDF file, you *must* have each student name and student number present at the beginning of the file.

Failure to follow these instructions will result in a mark of zero. Late assignments are not accepted and will result in a mark of zero. Only the best 4 of 6 assignments will be used for your final grade.
E.g. Directory structure:

- OnQ Submission Directory:
  - hw2.pdf
  - main.py
  - algorithms.py
  - unittests.py
  - ...

1 Programming - 6 points

Write a program in Python and verify that it works on the sample data (using the on-line Rosalind platform). For each problem:

1. Why you think your algorithm is correct (whether you program worked on the sample data or not).
2. Provide an estimate of the time and space complexity of your algorithm.
3. Add three unit tests using the Rosalind sample data, and some of your own. There must be at least one positive and one negative unit test.

Problems

1. Find an Eulerian Cycle in a Graph: `http://rosalind.info/problems/ba3f/`
2. Generate Contigs from a Collection of Reads: `http://rosalind.info/problems/ba3k/`

2 Theory - 4 points

2.1 Lesson 3.3

Construct a 4-universal string. / **1**

2.2 Peaceful Placement of Queens

/ **3**

In the game of chess a queen can move any number squares along a horizontal, vertical or diagonal path. See `https://en.wikipedia.org/wiki/Queen_(chess)`. A peaceful placement of n queens on an $n \times n$ chessboard places the queens so that no two queens are in each other's path. Consider a $n \times n$ chess board.

1. What is the smallest n such that n be peacefully placed?
2. Write a recursive algorithm that either places the n Queen's or determines that no such placement is possible.
3. Modify the algorithm so that it counts all peaceful placements.