

## CISC-471 FALL 2019

### HOMEWORK 7

Please work on these problems and be prepared to share your solutions with classmates in class on Monday Nov. 11. Assignments will **not** be collected for grading.

#### PROBLEMS

These questions come from *An Introduction to Bioinformatics Algorithms* by Neil C. Jones and Pavel A. Pevzner.

**Problem 8.1:** Can 99 phones be connected by wires in such a way that each phone is connected with exactly 11 others?

**Problem 8.2:** Can one use a 12-inch-long wire to form a cube (each of the 12 cube edges is 1-inch long)? If not, what is the smallest number of cuts one must make to form the cube?

**Problem 8.6:** Find the shortest common superstring for eight 3-mers:

{AGT, AAA, ACT, AAC, CTT, GTA, TTT, TAA}

and solve the following two problems:

- Construct the graph with 8 vertices corresponding to these 3-mers (Hamiltonian path approach) and find a Hamiltonian path (7 edges) which visits each vertex exactly once. Does this path visit every edge of the graph? Write the superstring corresponding to this Hamiltonian path.
- Construct the graph with 8 edges corresponding to these 3-mers (Eulerian path approach) and find an Eulerian path (8 edges) which visits each edge exactly once. Does this path visit every vertex of the graph exactly once? Write the superstring corresponding to this Eulerian path.

**Problem 8.8:** Find the shortest common superstring for all 8 3-digit binary numbers in 0-1 alphabet.