

CISC-471
WINTER 2015

HOMEWORK 1

Please work on these problems and be prepared to share your solutions with classmates in class on Monday January 12. Assignments will **not** be collected for grading.

PROGRAMMING

Write a program in the language of your choosing (I recommend Python) and verify that it works on the sample data (using the on-line Rosalind platform). For each problem be prepared to tell us why you think your algorithm is correct (whether your program worked on the sample data or not). Also provide an estimate of the time and space complexity of your algorithm.

Frequent Words Problem: <http://rosalind.info/problems/1a/>

Frequent Words with Mismatches and Reverse Complements Problem: <http://rosalind.info/problems/1h/>

PROBLEMS

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

Problem 2.2: Write one (or two if you wish) algorithms that iterate over every index from $(0, 0, \dots, 0)$ to (n_1, n_2, \dots, n_d) . Your algorithm can be iterative or recursive.

Problem 2.3: Is $\log n \in O(n)$? Is $\log n \in \Omega(n)$? Is $\log n \in \Theta(n)$?

Problem 2.10: Prove that $\sum_{i=1}^n i = n(n+1)/2$, for all $n \in \mathbb{N}, n \geq 1$.

Problem 2.11: Prove that $\sum_{i=1}^n 2^i = 2^{n+1} - 2$, and that $\sum_{i=1}^n 2^{-i} = 1 - 2^{-n}$ for all $n \in \mathbb{N}, n \geq 1$.