

CSC 411. Spring 2023

Homework #2

Due: Feb 14, 2023 (Tuesday) 11:59 pm

1. Textbook #3.1-4 (a) (b) (40 Points)

- 4. a.** Design a brute-force algorithm for computing the value of a polynomial

$$p(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$$

at a given point x_0 and determine its worst-case efficiency class.

- b.** If the algorithm you designed is in $\Theta(n^2)$, design a linear algorithm for this problem.
- c.** Is it possible to design an algorithm with a better-than-linear efficiency for this problem?

2. Textbook #3.2-8 (a) (20 Points)

- 8.** Consider the problem of counting, in a given text, the number of substrings that start with an A and end with a B. For example, there are four such substrings in CABAAXBYA.
- a.** Design a brute-force algorithm for this problem and determine its efficiency class.

3. Textbook #3.3-3 (40 Points)

- 3.** Let $x_1 < x_2 < \cdots < x_n$ be real numbers representing coordinates of n villages located along a straight road. A post office needs to be built in one of these villages.
- a.** Design an efficient algorithm to find the post-office location minimizing the average distance between the villages and the post office.
 - b.** Design an efficient algorithm to find the post-office location minimizing the maximum distance from a village to the post office.