CSCI B505 – Fall 2018

Written Assignment 2:

Due online Sept. 24 (MON), 2018, 11:59pm EST.

You can use LaTeX, Word, or even pen and paper to write down your answers. But **please try to submit a PDF file.**

1. Solve the following recursions with Big-O notation, assuming that $T(1) = \text{constant}$:

   (a) $T(n) = T(n/2) + n$

   (b) $T(n) = T(n/5) + n^2$

   (c) $T(n) = T(n/3) + \text{const}$

2. Given two integers x and n, describe and prove an algorithm that computes x^n. Is there any way to go faster than $O(n)$?

3. Describe and prove an algorithm that finds the median of two sorted arrays with equal length n in $O(n)$ time.

4. Describe the sorting algorithm you would choose to sort an array $A[]$ of n numbers in the following cases:

   (a) $A[]$ is nearly sorted;

   (b) $A[]$ consists of random numbers.

   Explain the reasons for your choice.