CSC-321 Design and Analysis of Algorithms
Section 401
Fall 2019-20

Instructor: Iyad Kanj
Office: CDM 832
Phone: (312) 362-5558
Email: ikanj@cs.depaul.edu
Office Hours: Monday & Wednesday 3:00 - 4:30
Course Website: https://d2l.depaul.edu/

Assignment #5
(Due November 18)

1. (20 points) Textbook, page 148, exercise 5.1, parts (a) and (b) only.
2. (20 points) Textbook, page 149, exercise 5.7.
3. (15 points) Textbook, page 149, exercise 5.9, only parts (a), (b), and (d).
4. (25 points) Pascal's triangle looks as follows:

```
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
...
```

   The first entry in a row is 1 and the last entry is 1 (except for the first row which contains only 1), and every other entry in Pascal's triangle is equal to the sum of the following two entries: the entry that is in the previous row and the same column, and the entry that is in the previous row and previous column.

(a) (10 points) Give a recursive definition for the entry $C[i, j]$ at row i and column j of Pascal's triangle. Make sure that you distinguish the base case(s).

(b) (5 points) Give a recursive algorithm to compute $C[i, j], i \geq j \geq 1$. Illustrate by drawing a diagram (tree) the steps that your algorithm performs to compute $C[6, 4]$. Does your algorithm perform overlapping computations?

(c) (10 points) Use dynamic programming to design an $O(n^2)$ time algorithm that computes the first n rows in Pascal's triangle.

5. (20 points) Textbook, page 178, exercise 6.4.