CSE3080/AIE3050 Data Structures
Spring 2024
Assignment 1
DUE: March 25 (5 p.m.)

Towers of Hanoi (20 points)

There are three towers (A, B, C) and n disks of different diameters placed on A. The disks are in order of decreasing diameter as one scans up the tower. Monks were supposed to move the disks from tower A to tower B obeying the rules:

- Only one disk can be moved at any time.
- No disk can be placed on top of a disk with a small diameter.

1. Write a recursive function in C (*student_NO*-`hanoi.c`) that prints out the number of moves needed to accomplish this task. (7 pts.)
2. Determine the space complexity. (3 pts.)
3. Determine the value of *count* when the function ends (under the assumption of unit step count only for an assignment, a conditional, or a return statement), and show the time complexity using O. (3 pts.)
4. Measure the performance (in terms of actual running time) with $n = 3, 10, 15, 20$, and summarize your findings. Determine the number of executions for each n accordingly. (7 pts.)

Turn in

- *hardcopy*:
  Prepare a report containing the code (*student_NO*-`hanoi.c`) and the result of sample runs, as well as all the answers for other questions.
- *softcopy*:
  Email *student_NO*-`hanoi.c` to `sogang2024.1.1.ds@gmail.com`. Your code should receive an integer input n which is the number of disks and output the total number of moves.