CSE 2320 Lab Assignment 4

Due March 29, 2018

Goals:

1. Understanding of minHeaps.

2. Understanding of backtracking.

Requirements:

1. Use C to implement the generation of all possible minHeaps. The priorities stored in the minHeap are the first *n* natural numbers (starting from 1, not 0).

   The input is 1) a non-negative integer *n* indicating the number of minHeap entries and 2) a non-negative integer *k* indicating how often a sample minHeap should be printed. If *k* is 0, then samples are not to be printed.

   The output is 1) the required samples, each preceded by its index; the sample is just the heap array printed in ascending subscript order and 2) a summary line of the form:
   `820019200 heaps for n=17, CPU=45.49`

2. Submit your program on Blackboard by 3:15 p.m. on March 29, 2018. One of the comment lines should include the compilation command used on OMEGA.

Getting Started:

1. `http://oeis.org/A056971` and `https://www.amazon.com/dp/0125586302/`

2. Code for collecting CPU times is at: `http://ranger.uta.edu/~weems/NOTES2320/selection.c`

3. The use of recursion is highly encouraged. It is convenient to place the priorities in ascending order while progressively nesting deeper in the recursion.

4. The order of your samples might vary from the provided executions.

5. You must generate the minHeaps. Using a formula to just count them is meaningless.

6. After your code is debugged, it will be useful to use the `-O3` compiler option to drastically decrease the run time.

7. *n* will not exceed 17.

8. Your code may not take longer than 200 CPU seconds.