

## CIS263 Heaps

*Dr. Denton Bobeldyk*

Complete the following:

- 1) Write a program that inputs N elements. A minimum heap data structure should be created to hold the N elements using the following two methods:
  - a. Elements inserted into the heap data structure one at a time
  - b. Use all the elements to build a heap in linear time (pass all the elements in at once)
- 2) The input/creation process should be repeated 3 times using the following criteria:
  - a. the input elements should be sorted from smallest to largest
  - b. the input elements should be sorted from largest to smallest
  - c. the input elements should be randomized.
- 3) Compare the run times for each of the 6 different approaches.
- 4) If a d-heap is stored as an array, for an entry located in position i, where are the parents and children? Be sure to note if your index starts at 0 or 1 and give examples demonstrating the correctness of your formula.

**Approved programming languages:** C, C++, C#, Python, Java.

**Hand-in:**





1. A file containing the source code for numbers 1 & 2
2. The output demonstrating the analysis of your program for numbers 1 & 2
3. The analysis for number 3
4. The solution to number 4

Note: Please do not upload zip files

**Grading Rubric**







### Run-time analysis comparison

Weight  %

Percent <input type="text" value="0.00"/> Incomplete  	Percent <input type="text" value="50.00"/> Partially complete  	Percent <input type="text" value="100.00"/> Complete  
--	---	--







### Run-time comparison demonstrated programmatically for each of the six different approaches

Weight  %

Percent <input type="text" value="0.00"/> Not demonstrated clearly  	Percent <input type="text" value="50.00"/> Limited demonstration  	Percent <input type="text" value="100.00"/> Clearly demonstrated  
--	--	--

### Correct locations for D heap

Weight  %

Percent <input type="text" value="0.00"/> None correct  	Percent <input type="text" value="50.00"/> Children or parent correct  	Percent <input type="text" value="100.00"/> Both correct  
--	---	--

See blackboard for point breakdown.