Implementation Assignment 2

The more thorough you are in your answers, the better your score will be. You may use this document to write your answers, or you may print and handwrite your answers. It must be legible though. If I cannot read it, I cannot grade it. Do not use ChatGPT, you may use the textbook or google. The textbook is provided to you in the About This Course.

In this homework you are requested to implement various operations on heaps, which you have seen in Chapter 7. There are two parts to this homework. The second part cannot be done before completing the first one.

Part 1:

Implement a heap data-structure using a class called Heap. Implement functions to do the following:

1. find the left child of a node (find_left) (5 points)
2. find the right child of a node (find_right) (5 points)
3. find the parent of the node (find_parent) (5 points)
4. return the value at a given node (get_value) (5 points)
5. heapify (heap) (15 points)
6. build heap (build_heap) (15 points)

Hints and instructions:

- You should also have an appropriate constructor and destructor.
- In parenthesis is how I expect you to name your functions.
- Call your file Heap.py and make sure all helper functions in the file

Part 2:

Add on to your previous program, implementing functions to:

1. sort using the heap (heap_sort) (15 points)
2. extract the maximum value in the heap (extract_max) (10 points)
3. insert values into the heap (insert) (15 points)
4. hand in a README file, an analysis of the *best and worst case running times* of each of *your* functions, (10 points)