This assignment covers textbook Chapter 6 and Chapter1~5.

1. Heaps (15 points)
Given the set of integers: {3, 80, 19, 72}, how many different MAX HEAPs can be made using these integers? Justify your answer.

2. **Heap and Heap property** (15 points)
Array A contains integers from 1 to 2047 (including both of them) exactly once and the array is already built as a min-heap. The depth of a node in the heap is defined as the length of the path from the root of the heap to that node. Therefore, the root is at depth 0.   What is the maximum depth at which integer 10 can appear? Justify your answer.

3. **Heap and Heap property** (15 points)
Provide a tight bound for the running time of finding the smallest element in a binary max-heap with n elements? Justify your answer.

4. **Heap Sort** (15 points)
Using Figure 6.4 as a model, illustrate the operation of HEAPSORT on the array
A = <6, 13, 1, 45, 7, 19, 20, 8, 5>

5. **Priority Queue** (40 points)
Textbook Exercise 6.5-8 (P 166). Provide (1) pseudocode, (2) correctness justification, and (3) provide an upper bound of your procedure and give an explanation.