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## Section: 7

**The following programming assignment measures the ability to analyze and implement Heap-Sort algorithm. You are required to work individually in this work.**

a. Write all required algorithms needed to sort a sequence of numbers using Heapsort Algorithms.

```
heap(list):
n = length(list)
for i = n/2 - 1 down to 0:
    Heapsort (list, n, i )
for i = n - 1 down to 1:
    swap(list[0], list[i ])
    Heapsort (list, i , 0)
Heapsort(list, n, i):
    n → Size of the heap
    i → Index
    large = i
    l= 2 * i + 1
    r=2 * i + 2
    If left < n and list[l] > list[large]:
        Large= left
    If r < n and list[r] > list[large]:
        L=r
    If large ≠ i:
        Swap list[l ] and list[large]
    Heapsort(list, n, large)
```

*b. Analyze in detail your written algorithms in Part (a).*

Time Complexity:

The Heapsort function is called on  $n/2$  is time  $O(\log n)$

To sorting : The loops repeats  $n-1$  times

Total time complexity is  $O(n \log n)$ .