

Fundamental Algorithms

Note: exercises 1 and 4 are slightly different to those given on the German version of the worksheet.

Exercise 1

Compute the number of comparisons that will be performed by MERGESORT in the best case.

Exercise 2

State the minimal and maximal number of elements that can be stored in a heap of depth d .

Exercise 3

Prove: for each subtree of a heap, the maximal number of this subtree will be stored in its root.

Hint: use the heap property for your proof.

Exercise 4

Prove the correctness of the algorithm BUILDHEAP:

```
BUILDHEAP( A: Array[1..n]) {  
    heapsize := n;  
    for i from n downto 1 do {  
        HEAPIFY(A,n,i)  
    }  
}
```