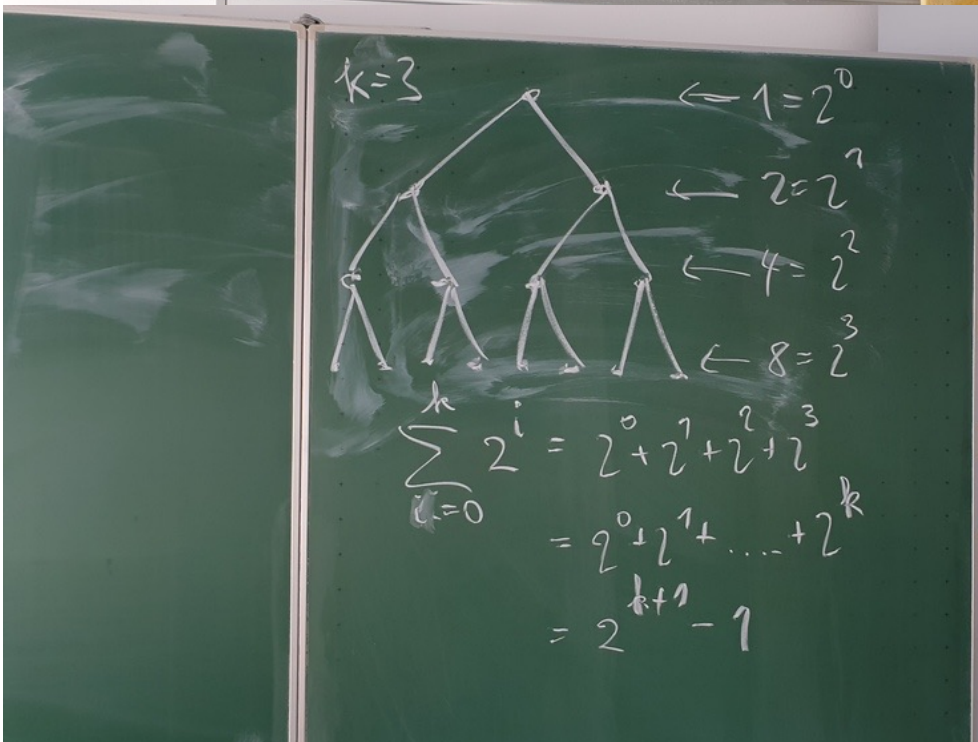
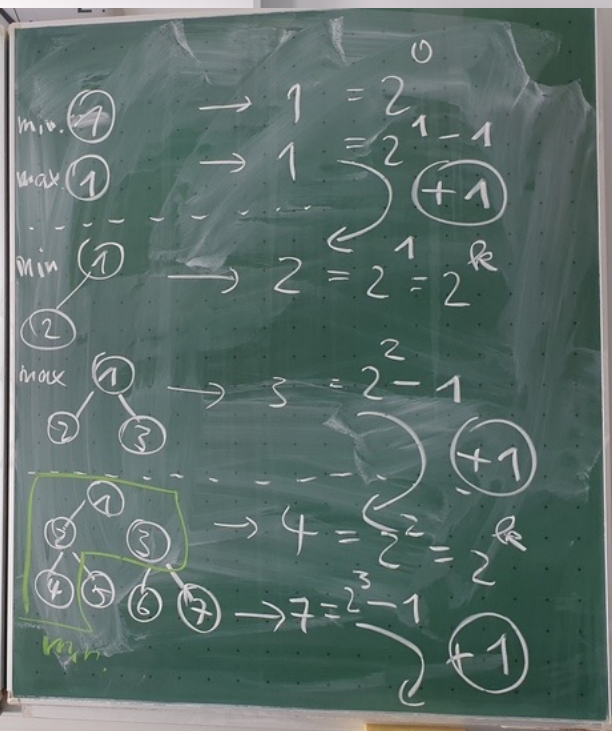
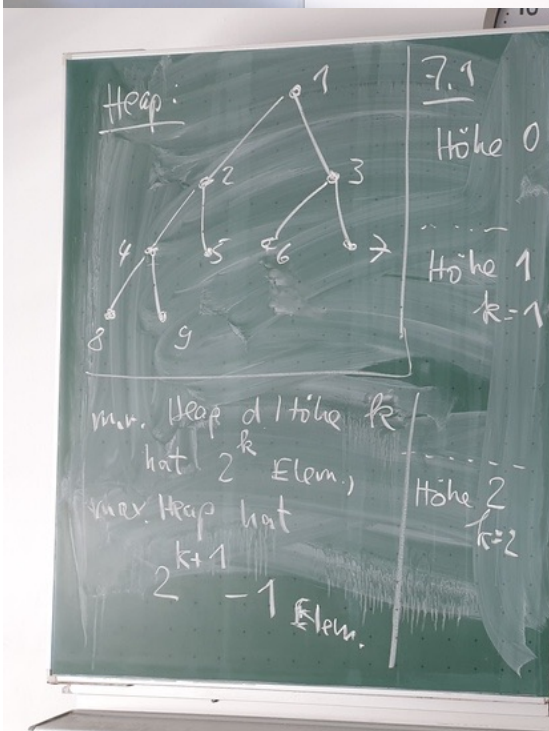




$i = 4$
 $j: 1..11$
 $A = \langle 13, 13, 9, 5, 12, 8, 7, 4, 21, 2, 6, 11 \rangle$
 $\langle 9, 19, 13, 5, 12, 8, 7, 4, 21, 2, 6, 11 \rangle$
 $\langle 9, 5, 13, 19, 12, 8, 7, 4, 21, 2, 6, 11 \rangle$
 $\langle 9, 5, 8, 19, 21, 13, 7, 4, 21, 2, 6, 11 \rangle$
 $\langle 9, 5, 8, 7, 4, 13, 19, 12, 21, 2, 6, 11 \rangle$
 $\langle 9, 5, 8, 7, 4, 2, 6, 11, 21, 13, 19, 12 \rangle \rightarrow \text{return } 8$

$qs(A, 1, 12)$
 part. (A, 1, 12) $\rightarrow 8$
 $qs(A, 1, 7)$
 $qs(A, 9, 12)$



Zeichnen Sie dazu
 Sie manuell durch
b) Aufgabe 6.1-5
 vorliegt, ein Min-
c) Aufgabe 6.1-6
 $\langle 23, 17, 14, 6, 13, \dots \rangle$
d) Aufgabe 6.5-1
 EXTRACT-MAX au
e) Aufgabe 6.5-2
 HEAP-INSERT(A,
 $A = \langle 15, 13, 9, 5, \dots \rangle$



c)

```

    23
   /  \
  7  14
 /  \  /  \
6   13 10  1
/  \
5  7 12

```

d)

```

    15
   /  \
  13   9
 /  \  /  \
5  12 8  7
/  \
4  0 6  2

```

e)

```

    13
   /  \
  12   9
 /  \  /  \
6  2 8  7

```

e)

```

    15
   /  \
  13   9
 /  \  /  \
5  12 8  7
/  \  /  \
4  0 6  2  1  10

```

insert (10)

```

    15
   /  \
  13   9
 /  \  /  \
5  12 10 7
/  \
4  0 6  2  1  8

```

Arbeitsweise v
A = {5, 13, 2, 2}

sort



7.2 | b)

$A = \langle 5, 13, 2, 25, 7, 17, 20, 8, 4 \rangle$

```

    25
   /  \
  13  20
 /  \  /  \
8  7 17  2
/  \
5  4

```

Max Heapify

$\langle 25, 13, 20, 8, 7, 17, 2, 5, 4 \rangle$

$\langle 4, \dots, 25 \rangle$ sort

wird ein MaxHeap

$\langle 5, 13, 17, 8, 7, 4, 2, 20, 25 \rangle$

$\langle 4, 8, 5, 2, 7, 13, 17, 20, 25 \rangle$

$\langle 2, 4, 5, 7, 8, 13, 17, 20, 25 \rangle$



len(Liste) für eine Liste mit n (echten) Elementen
Wert $n+1$ zurückgibt.
b) Aufgabe 6.4-1 (S. 162): Illustrieren Sie die Arbeitsweise von Heapsort, angewendet auf
 $A = (5, 13, 2, 25, 7, 17, 20, 8, 4)$.

$8, 7, 17, 2, 5, 4 >$
 $25 >$
ein MaxHeap
 $7, 4, 2, 20, 25 >$
 $13, 17, 2, 20, 25 >$
 4
 2
 $8, 13, 17, 20, 25 >$

13
 8 7
 5
 13
 8 7
 13
 8 7
 4
 2
 5
 8 7
 4
 5
 2
 4
 5
 2
 4

20
 13 17
 8 7 4 2
 17
 13 5
 8 7 4 2
 13 5
 8 7 4
 6 5
 7 5
 2 4

7.3 a) $< 13, 19, 9, 5, 12, 8, 7, 4, 21, 2, 6, 11 >$
partition(A, 1, 12)
 $9 | 19, 13, 5, 12, 8, 7, 4, 21, 2, 6, 11$
 $9, 5 | 13, 19, 12, 8, 7, 4, 21, 2, 6, 11$
 $9, 5, 8 | 19, 12, 13, 7, 4, 21, 2, 6, 11$
 $9, 5, 8, 7 | 12, 13, 19, 21, 2, 6, 11$
 $9, 5, 8, 7, 4 | 21, 2, 6, 11$
 $< 9, 5, 8, 7, 4, 2, 6, 11 >$

$7, 4, 21, 2, 6, 11 >$
 $7, 4, 21, 2, 6 | 11$
 $7, 4, 21, 2, 6 | 11$
 $7, 4, 21, 2, 6 | 11$
 $19, 4, 21, 2, 6 | 11$
 $6, 12, 21, 13, 19 | 11$
 $11 | 21, 13, 19, 12 >$ return 8