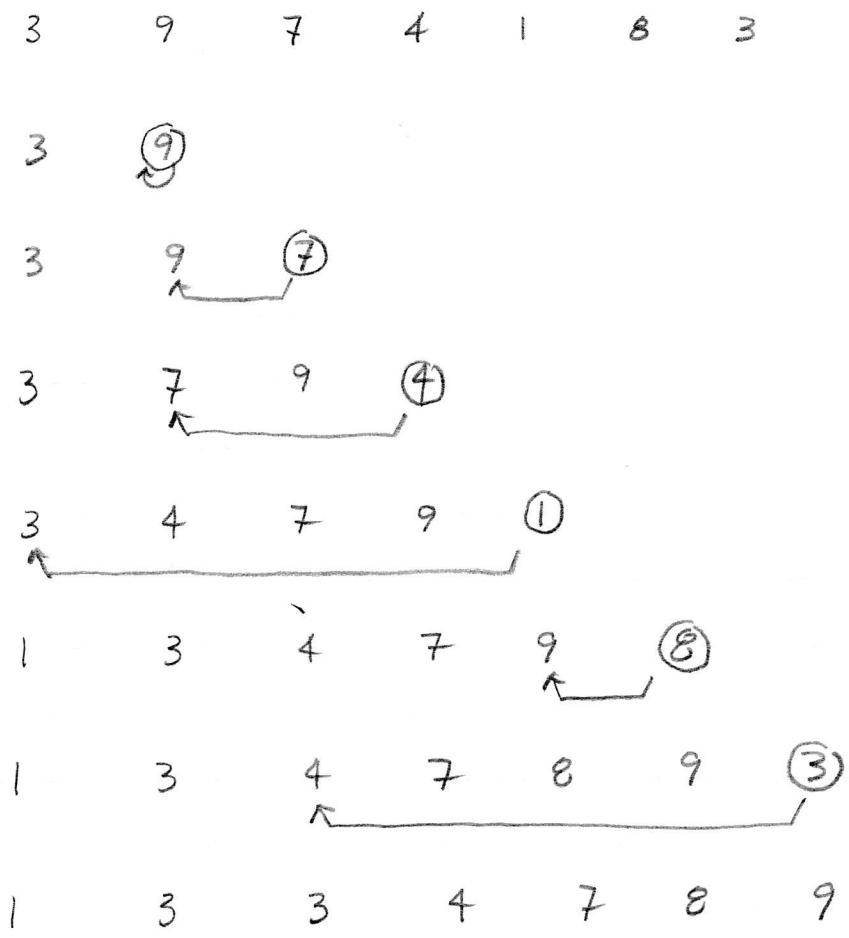
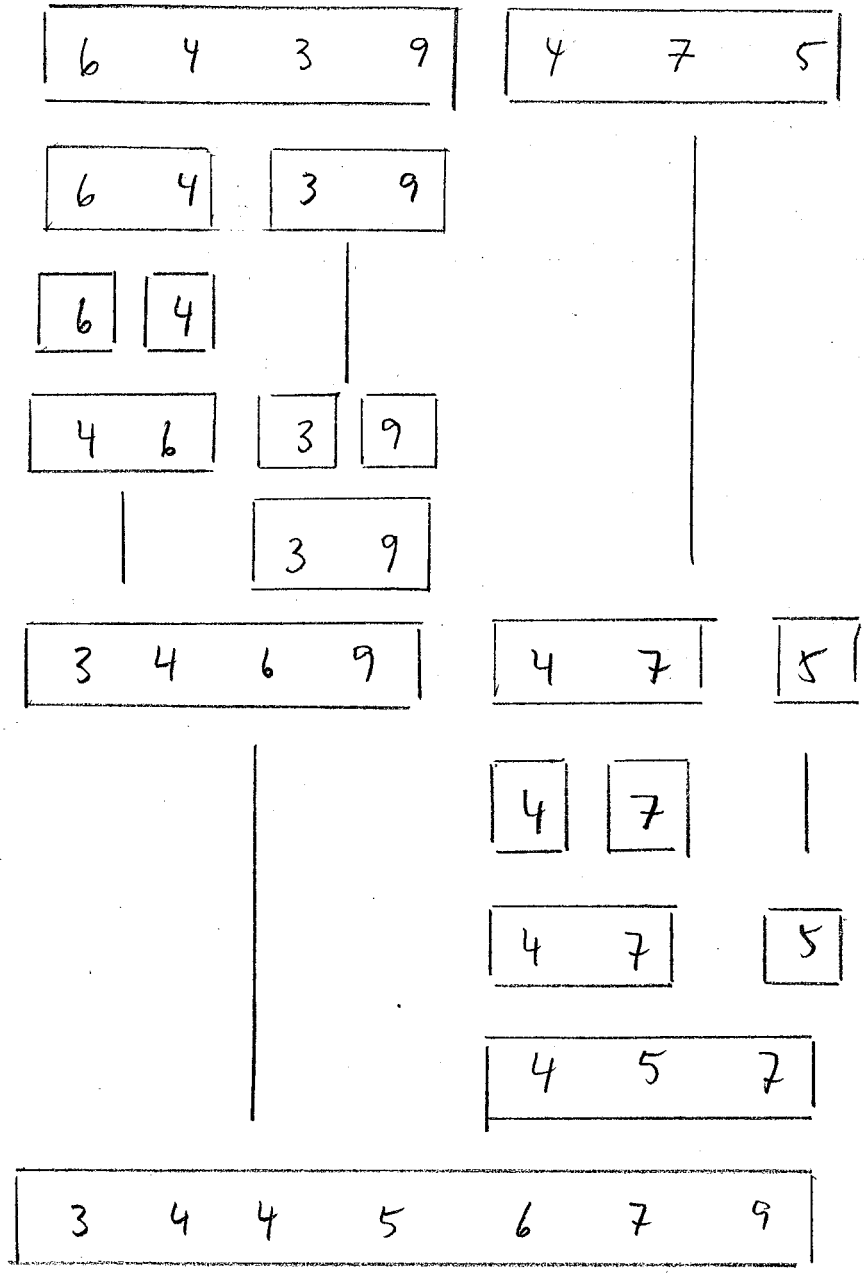
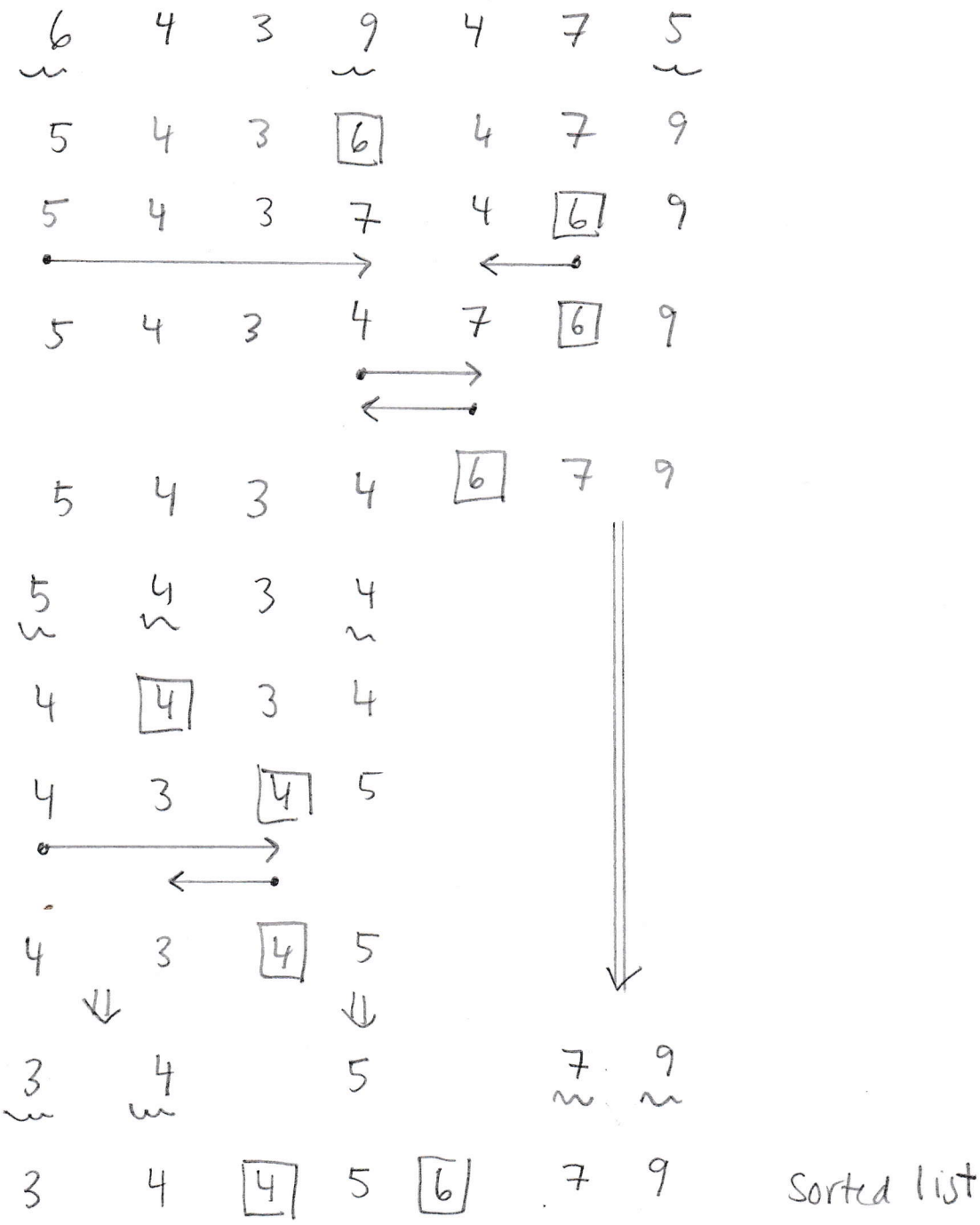
HW 1 Problem 1



HW2 Problem 1



HW3, Problem 1



HW4, Problem 1

$T(1) = 1$

$T(N) = 2\,T(N/2) + cN$

$$\frac{T(N)}{N} = \frac{T(N/2)}{N/2} + c$$

$$\frac{T(N/2)}{N/2} = \frac{T(N/4)}{N/4} + c$$

$$\vdots$$

$$\frac{T(2)}{2} = \frac{T(1)}{1} + c$$

} $\log N$ expressions

$$\frac{T(N)}{N} = \frac{T(1)}{1} + c \log N$$

$$T(N) = N\,T(1) + c\,N \log N$$

$$= O(N \log N)$$

HW 4, Problem 2

$T(1) = 1$

$T(N) = 2\,T(N/2) + cN$

⇓

$T(N) = 2(2T(N/4) + cN/2) + cN$

$= 4T(N/4) + c2N$

⇓

$T(N) = 4(2T(N/8) + cN/4) + c2N$

$= 8T(N/8) + c3N$

⇓

$T(N) = 2^k T(N/2^k) + ckN, \quad \max k = \log N$

⇓

$T(N) = 2^{\log N} T(N/2^{\log N}) + cN \log N$

$= N T(1) T(N/N) + cN \log N$

$= O(N \log N)$