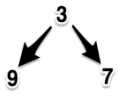
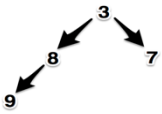
Problem 1:

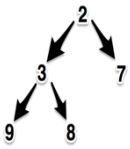
a)

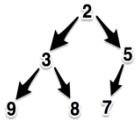
1. Insert 3:  Array: 3

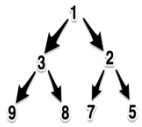
2. Insert 9:  Array: 3 9

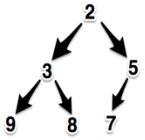
3. Insert 7:  Array: 3 9 7

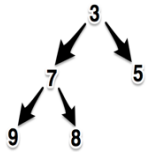
4. Insert 8:  Array: 3 8 7 9

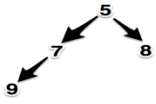
5. Insert 2:  Array: 2 3 7 9 8

6. Insert 5:  Array: 2 3 5 9 8 7

7. Insert 1:  Array: 1 3 2 9 8 7 5

Delete Min (First time):  Array: 2 3 5 9 8 7

Delete Min (Second time):  Array: 3 7 5 9 8

Delete Min (Third time):  Array: 5 7 8 9

b)

Max heap: Array [null 9 8 7 3 2 5 1]

Delete Max: Array [null 8 3 7 1 2 5 9]
Delete Max: Array [null 7 3 5 1 2 8 9]
Delete Max: Array [null 5 3 2 1 7 8 9]
Delete Max: Array [null 3 1 2 5 7 8 9]
Delete Max: Array [null 2 1 3 5 7 8 9]
Delete Max: Array [null 1 2 3 5 7 8 9]
Delete Max: Array [null 1 2 3 5 7 8 9]

Problem 2:

a. $N + (N + 1) + (\Big(\big(N + (N + 1)\big) + 1\Big) = 4N + 3 = N$

b. $2^{2logN+1} = 2^{2logN+log2} = 2^{log\ 2N^2} = 2N^2 = N^2$

c. $2^{4.1logN+1} = 2^{4.1logN+log2} = 2^{\log 2\ N^{4.1}} = 2N^{4.1} = N^{4.1}$

d. $2^N - 1 = 2^N$