1)

|  | O | o | Ω | ⍵ | 𝛩 |
| --- | --- | --- | --- | --- | --- |
| a) | YES | YES | NO | NO | NO |
| b) | YES | YES | NO | NO | NO |
| c) | NO | NO | NO | NO | NO |
| d) | NO | NO | YES | YES | NO |
| e) | YES | NO | YES | NO | YES |
| f) | YES | NO | YES | NO | YES |

2) a)   
Master method -   
a = 2, b = 2,   
  
Since = Ω() and   
b)   
a = 1, b = 10 / 7,   
  
Since = Ω() and   
c)   
a = 16, b = 4,   
  
Since = 𝛩()  
d)   
a = 7, b = 3,   
  
Since = Ω() and   
  
  
  
e)   
a = 7, b = 2,   
  
Since = O()   
f)   
a = 2, b = 4,   
  
Since = 𝛩()  
g)  
  
  
  
3) a)   
a = 4, b = 3,   
  
Since = O()   
b)   
a = 3, b = 3,   
  
  
  
c)   
a = 4, b = 2,   
  
  
Since = Ω() and   
  
  
  
  
  
d)   
Since, the subtraction inside of the argument T does not contribute to the asymptotic complexity.  
  
a = 3, b = 3,   
  
Since = ()   
e)   
a = 2, b = 2,   
  
  
  
f)

g)   
  
   
   
h)   
   
   
   
   
Equation (3.19) from page 58 of the textbook. ( = )  
  
i)   
   
   
   
  
  
  
  
j)   
  
   
   
  
   
   
Therefore,   
  
4) a) We can consider counterexample:

Input array A = (4, 5, 6)  
BUILD-MAX-HEAP(A): A = (6, 5, 4)  
BUILD-MAX-HEAP’(A): A = (6, 5, 4)  
  
b) Each insertion takes at most , since we are doing it n times, we get the complexity of   
  
5)