**4.3-1**



**1. Substitution method**

If. T(n) < c\*n^2

T(n) < c\*(n-1)^2 + n

< c\* n^2 – 2cn + c + n

= c\*n^2 – ( 2c\*n - n –c) … desired–residual

<= c\*n^2.

Whenever c + n <= 2cn. For example, if c>=1, n>=1.

**2. recursion tree**

T(n) = T(n - 1) + n

= T(n – 2) + (n – 1) + n

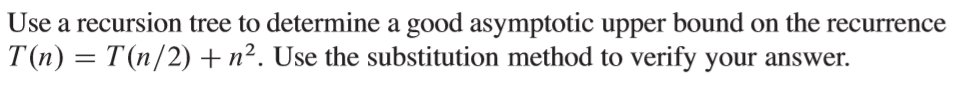
….

= T(0) + 1 + 2+ .. n-2 + n-1 + n ….. arithmetic series

= T(0) + n(n+1) / 2

= O(n^2)

**4.4-2**



n^2

(n/2)^2

(n/4)^2

….

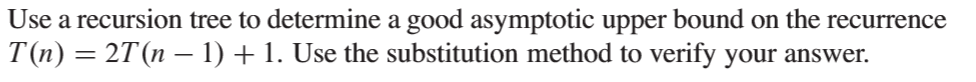
Therefore

= O()

**Substiution**

Whenever = . T(n) = O()

**4.4-4**



**Recursion tree**

Tree is binary tree.

Height: n

Cost: 1

Max Num of Tree node: 2^h+1 – 1

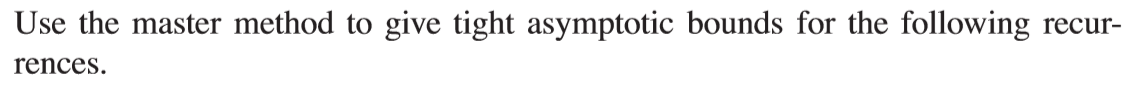
Therefore T(n) = O(2^n)

**Substiution**

– c

Whenever = . T(n) = O()

**4.5-1**





-> T(n) = Θ(



-> T(n) = Θ( lg n)



-> T(n) = Θ(



-> T(n) = Θ(

**7.1-1**

**7.1-3**

**7.2-4**

**7.4-5**

**8.2-2**

**8.2-4**

**8.3-1**

**8.3-2**

**9.1-1**

**9.3-3**

**9.3-7**

**9.3-9**