



PROBLEM SOLVING

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OBJECTIVES:

- FORMULATION OF RECURRENCE EQUATION
- SOLVING RECURRENCE EQUATION
 1. GUESS AND VERIFY
 2. SUBSTITUTION
 3. RECURRENCE TREE

Formulation Of Recurrence Equations

1. 1000, 2000, 4000, 8000
2. 7 , $21/4$, $63/16$, $189/64$
3. Maximum possible edges in a graph
4. Staircase Problem
5. Triangular Number

Solving Recurrence Equation

- Solution must be non-recursive
- This solution is called closed-form solution
- Sometimes, there might not be a closed form solution

Closed – Form Solution

General Solution

Example : $T(n) = n!$

Particular Solution

Example : $T(n) = T(0) + 5$

Guess And Verify

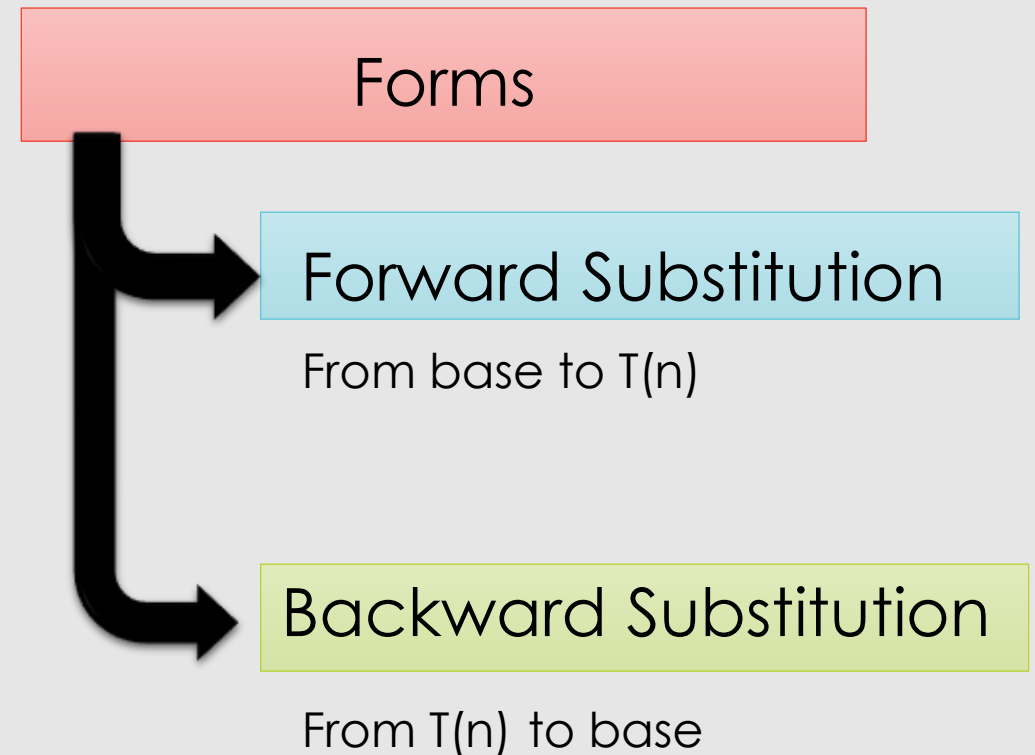
1. $T(n) = T(n-1) + 2$

2. $T(n) = T(n-1) + n^2$

3. $T(n) = 3T(n/2)$

Substitution Method

- Also called iteration method.
- Or the Plug and Chug Method
- Plug means Substitute
- Chug means Evaluate



Substitution Method

1. $T(n) = T(n-1) + 3$

$$T(1) = 4$$

2. Compound Interest for \$100 at 3%

3. $T(n) = n * T(n-1)$

$$T(0) = 1$$

4. $T(n) = k * T(n-1)$

Recurrence Tree Method

$$1. T(n) \begin{cases} 1 & n=1 \\ T(n-1) + a & n>1 \end{cases}$$

Find the time complexity when $a=1$ and when $a=n$

Recurrence Tree Method

$$\begin{array}{lcl} 1. \ T(n) & \left\{ \begin{array}{ll} 1 & n=1 \\ 8 \cdot T(n/2) & n>1 \end{array} \right. & \text{Find the time complexity} \end{array}$$



THANK YOU