Parshvanath Chartable Trust's

(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)
(Religious Jain Minority)

SEM -V (LT)

Subject :- ADSAA

SEM -V (I.T)

	Example 2, Substitution Method
	Example 2, Substitution Method Given recurrence relation is as follows,
	$T(n) = \begin{cases} 1 & \text{if } n=1 \\ n * T(n-1) & \text{if } n > 1 \end{cases}$
11	
	If n=1 T(n)=1 This is our base cond'
	or termination correction
	condition where we have
25	Stop.
25	Otherwise if n>1
25	Otherwise if n>1
25	Stop.
25	Otherwise if $n > 1$ The recurrence relation is $T(n) = n * T(n-1) - 0$
25	Otherwise if $n > 1$ The recurrence relation is $T(n) = n * T(n-1) - 0$
25	Otherwise if $n > 1$ The recurrence relation is $T(n) = n * T(n-1) - 0$
25	Otherwise if $n > 1$ The recurrence relation is $T(n) = n * T(n-1) - 0$
25	Otherwise if n>1 the recurrence relation is

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## A. P. SHAH INSHHHUMD OF THECHNOLOGY

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$$T(n-2) = (n-2) * T(n-2)-1$$
  
=  $(n-2) * T(n-3) - 3$ 

Now we will use the substitution method

Substitute eqn (2) in eqn (1)

T(n) = n \* (n-1) \* T(n-2)

we have already calculated T(n-2)
So let's put eqn (2) here

T(n) = n \* (n-1) \* (n-2) \* T(n-3)

What we will get in next iteration

T(n) = n \* (n-1) \* (n-2) \* (n-3) \* T(n-4)

So we have observed that our function T(n-4)

It goes on decrementing

Our aim is to go on t decrementing till the function terminates.

For this we will you use our base condition.

For this we have to go on terminating decrementing till n-1 steps

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So after n-1 steps our equation becomes = n/\*(n-1) \* (n-2)/\*(n/3)/.../.= n \* (n-1)\*(h-2)\*(h-3)...\*T(n-(n-1))= h \* (h-1) \* (n-2) \* (n-3) ... \* T (n-n+1)= h \* (h-1) \* (h-2) \* (h-3) ... \* T(n-n+1)= n \* (n-1) \* (n-2) \* (n-3) ... \*T(1)we know T(1) = 1 is our base condition =  $n * (n-1) * (n-2) * (n-3) \cdots * 1$ The series we have is as follows, = n\*(n-1)\*(n-2)\*(n-3)....\*3\*2\*1Take nout from each egn, = h \* h (1-1) \* h (1-2) \* ..., h (3) \* n (2) $*h(\frac{1}{n})$ If we have non nitis represented as n3 So our egn can be written as n' we can write this as O(n') which is our factorial time complexity

Prof. A. N. Aher

Department of Information Technology