## Outline # 5

## Recurrence Relation:

A recurrence relation for the sequence fang is an equation that expresses an in terms of one or more of the previous terms of the sequence, namely an any for all integers in with nine where no is a non-negative integer.

A sequence is called a solution of a recursively define or sequence relation if its terms salisty the recurrence relation.

Let {an} be a sequence that satisfies

the recurrence relation an = an-1 + 3

for n=1,2,3,... and suppose that

an = 2. What are a, a fas?

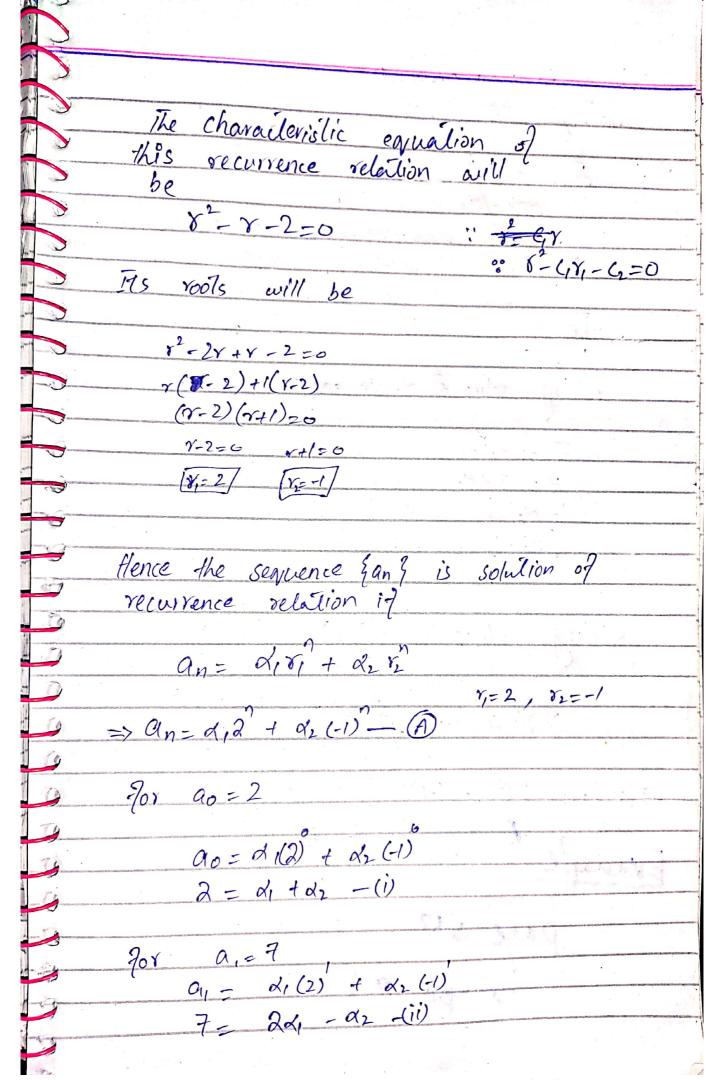
We see from the recurrence relation that

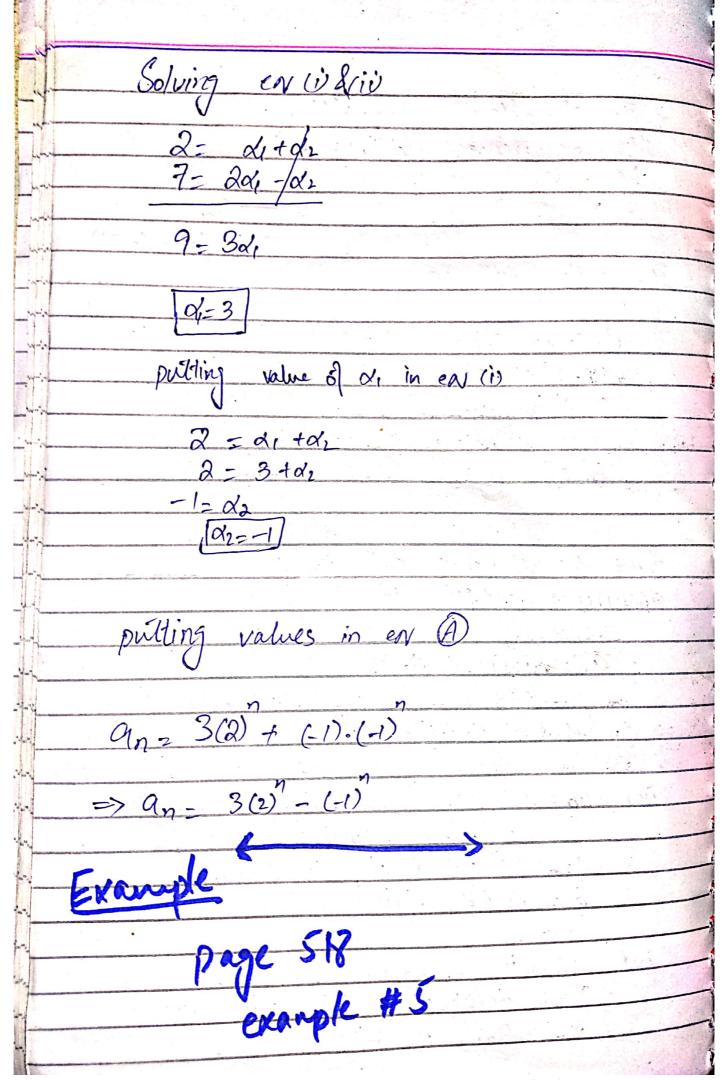
 $a_1 = 2+3=5$   $a_2 = 5+3=8$ 

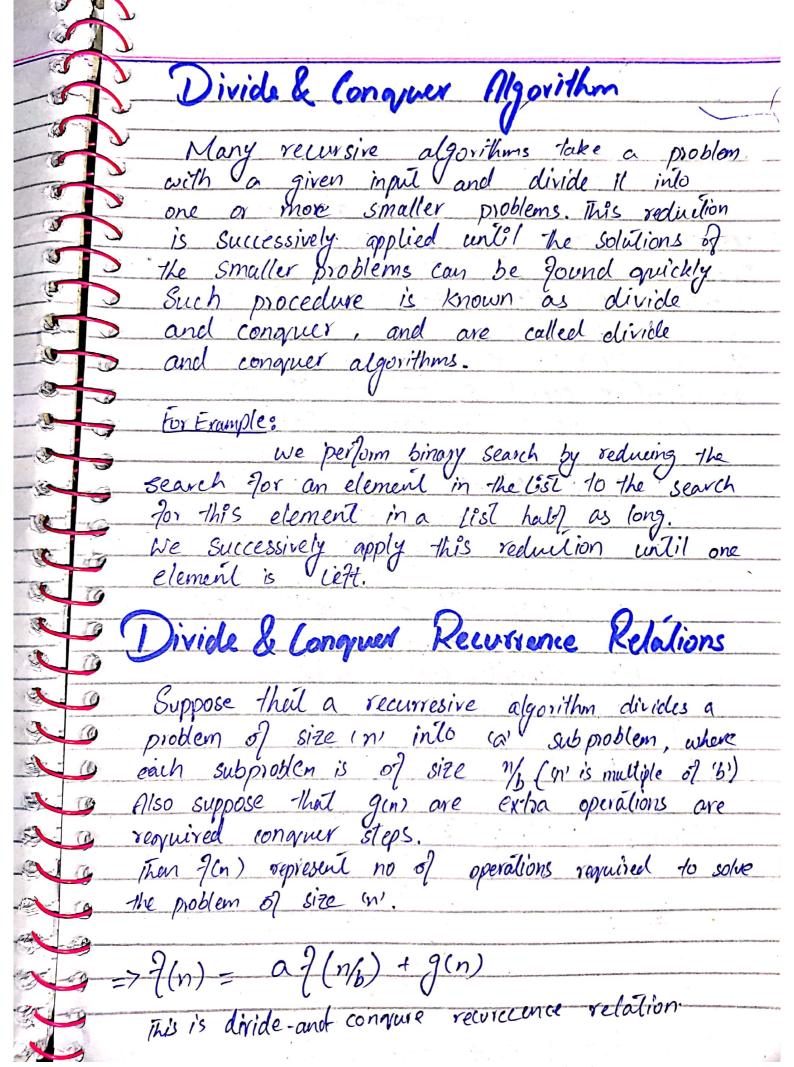
 $a_{3} = a_{2} + 3$   $a_{3} = 8 + 3 = 11$ .

5	Solving Linear Recurrence Relations
	THE THE TELEVISIONS
	A linear homogenous recurrence relation of
3	degree K with mile is a Division to in
	degree K with constant coefficients in a recurrence relation of the form
	CONTROL DECEMBER OF THE CONTROL OF T
	an= C, an-1 + C, an-2 + + Ckan-k
-	where
-	C, C2,, Ck are real numbers,
	and GLO
	=> In recurrence relation the right side is  the sum of previous 7ems of sequence  eath multiplied by afunction of n.
and Assessment	The sum of previous 7ems of sequence
	each multiplied by afunction of n.
	Solving Linear Homogenous Kelvyrinec
	Solving Linear Homogenous Recurrence Relations with Constal Coefficient
	the basic method for solving worker nomogenous
	recurrence relation is 16 look for so luctors
- Marine	of the form an=7
	The basic method for solving lienear homogenous recurrence relation is 16 look for so williams of the form an=1 where r is a constant.
	where of a constant of recurence relation of and only if
	& an = 8 is the solution of recurence reaction
	if and only if
and the same process are acceptant.	$\gamma^{n} = C_{1}\gamma^{n} + C_{2}\gamma^{n} + \dots + C_{K}\gamma^{m-K}$
	7 = C,7 + C27 + ··· + CK

For two distinct roots
Let 9 and C2 be real numbers Suppose
Ther r'- C, r - C, = 0 has two distinct
rools of and r. Then the sequence {an}
is a solution of the recurrence relation
an= Cian-1 + Coto Cia
if and only if
$-\left[\alpha_{n}=\alpha_{i}\gamma_{i}^{2}+\alpha_{i}\gamma_{i}^{2}\right]$
= 70x n = 0, 1.2
where of & dr are constant
Evample:
what is the solution of the
recurrence relation
$-a_n = a_{n-1} + 2a_{n-2}$
with a = 2 & a = 77
Solution
: anz cian-1 + Czan-2
en
$\alpha_n - \alpha_{n-1} + 2\alpha_{n-2}$
SO G=1 & C=2







k**	
	Use of Divide-and-Conquer Recursison relation in some important algorithms
سامدار	in some important algorithms
ر المعمر	
,	i Binary Search:
	reduces the search for an element in a
	reduces the search Ugor an element in a
	Search sequence of size n to the binary
_,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	search for this element in search of size n/2.
	1 store ni is excen
	Hence if J(n) is the number of comportsion
لروسيه	Hence if J(n) is the number of comportsion required to search for an element in
	a search sequence of size 'n', -then
_,,,,,,,,,	
	$\frac{2(n)}{2} = \frac{2(n/2)}{2} + 2$
	in is even.
	(iv Merge Soil
and the state of the state of	he merge soil algo spuls a usu
-11-	to be sorted with n items, into two lists
	with n/2 elements each, and uses fewer
-4.5 str.	than n companisions to merge the two
	Soited UST of n/2 items each into one
	gorled list
Ser Tu Baran	
	M(n) = 2M(n/2) + 2