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	Date
	Luterial -01.
	Line of the same and the same of the same
(A-1)	ci) Big O(n)
1 22	$f(n) \ni o(g(n))$
Marin Jak	for same constant, c >0.
	for same constant, c Some
	g(n) is tight upper bound of f(n) n -> no
\ -	ego
	(ii) by emega (1)
***	nehen f(n) - 2 (g(n)) mans g(n) to is total
	lowerbound of f(n) i.e. f(n) can go beyondger  i.e. f(n) = 2 g(n) f(n) can go beyondger
1.4	is and only is func.
- \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	y and only y
	t n2 no g c = constant > 0
	West Note - answer
e e	$\sim \sim $
	(ii) Big Theta (0)
	when y(n) = 0 (g(n)) gives the tight upperbound
	and lowerbound both.
	ie. $f(n) = O(g(n))$ func
,	y and only ex
	$C_1 * q(M_1) \le l(M) \le C_2 * q(M_2)$
	for all ny max (x, n2), some
	Constant C1>0 4C2 >0
	I.e. I(n) can nevel go begond (2 g/h) & huch ne
	ec come donen of cigans.

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	(iv) Small O(0)
	when $f(n) = og(n)$ gives the upper bound.
	i.e. f(n) = Og(n) ((g(a))
	conly if fine.
1	Othnono fino
28	C - C (n) 130 John mer morph : A John C
	$N \longrightarrow N_0$
	(v) Small omega (w)
33 2	et give the lower bound'ie. f(n) = w (g(n)).
	et gives the 'lower bound' ie. $f(n) = \omega(g(n))$ .  welvere $g(n)$ is lower bound of $f(n)$ if and only if $f(n) > c * g(n) * v > v, & some constant, c > o$ .
. 4	f(n)> c + g(n) + n> n, & some constant, c >0.
€. €.	func. ( f(m)
	1 9(m)
	i de la descripción de la desc
0	N - M
<b>A</b> . \	(a) betall as the contract of
07)	for i => 1,2,4,6,8 n times.
	ce series. is a G.P. De la
	So $a=1$ , $R=2/1$ .
	kth value of G.P:
	$t\kappa = \alpha k + 1$ $t\kappa = 1(2)k - 1$
	$t_{K} = 1(2)^{n}$
	2m = 2K
• )	log n (2n) = klog2 log 2 + log n = k = log n+1 = k meglecting
	1 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2 1 2 2 1 2
	So sime complexity T(n) > o(logen)ons.
	2- , survey of the first
1.1	

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Q4)	T(n) = 2T(n-1)-1  if  n>0, ettrerwise 1
	ettrernise 1
	1
	The Table
	$T(n) = 2T(n+1) \longrightarrow (1)$
	$Put n = n-1.$ $T(n+1) = 2T(n-2) - 1 \longrightarrow (2)$
	$T(n+1) = 2T(n-2) - 1 \longrightarrow (2)$
	Due to the second of the secon
	$T(n) = 2x(2T(n-2)-1)-1 \Rightarrow 4T(n-2)-2-1-3$
·	put n=n-2 in (1)
	T(n-2) = 2T(n-3)-1.
	put in (1) Parot Bold words
	put in (1) $T(n) = 8T(n-3) - 4-2-1 + 9$
	. 9 D V 7 L. 1 D W -
	kth term
	Let $n-k=1 \not \ni k-n-1$ .
	$T(n) = 2^{n-1}T(1)-2^{n}(1)+1++1$
	2 (2 2 2 2 2 )
	$=2^{n-1}-2^{n-1}/1+1+1$
	2 2 2 2 2 -1)
	in series in GP
	a = 1/2, r = 1/2
	So Maria Maria
	$T(n) = 2^{-1} \left( 1 - \left( \frac{1}{2} \left( 1 - \left( \frac{1}{2} \right) \right) \right) \right)$
	1-12
	$=2^{n-1}(1-1+(v_2)^{n-1})$
	= 2 T(n) = 0(1) Ans.
	2 4-1

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0.6	1
	Irme complexity of:
	$ \begin{array}{c} \text{L} & \text{As } i^2 = n \\ i = \sqrt{n} \end{array} $
	$i = 1, 2, 3, 4, \sqrt{n}$
	≥ 1+2+3+4++√n.
	≥ 1+2+3+4++√n·
	$T(n) = \sqrt{n} + (\sqrt{n} + 1)$
v	(S) 11 7 5 5 1- (-12 1) 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	$T(n) = n + \sqrt{n}$ $\Rightarrow$ $T(n) = o(n)$ Ans
	2
MI	
2-7	line for k=k²
	K = 1,2,4,8 k series is in GP.
	so and so on GP.
	$80 = 1, R = 2$ $a(8^{4}-1) = 1/2K-1$
	$a(2^{n}-1) \rightarrow 1(2k-1)$
74	
,	$n=2^{k}-1 \Rightarrow n+1=2^{k} \Rightarrow \log(n)=k$
	Comment of the second of the s
	lug(n) lug(n) * lug(n)
	: log(n) leg(n) & log(n)
	$2 \log(n)$
	n løg(n) log(n) + log(n)
	TC 7 of nor logn + logn)
	= $0$ $($ $0$ $0$ $0$ $0$ $0$ $0$ $0$ $0$ $0$ $0$
	$\Rightarrow$ $o(n \log^2(n)) \rightarrow gne$ .

go for (i=1 ton)	
we get i=n times every tuen	
$i \neq j = n^2$	(*) (*)
for (i = 1 to n)  we get j=n tunies every turn.  i * j = n <sup>2</sup> kth,	
Now, Letters	
$T(n) = n^2 + T(n-3);$	
$T(n-3) = (n^3 3)^2 + T(n-6)$	
$T(n-6)=(n^36)^2+T(n-9)$	
and T(1)=1.200 + 3 900 1	
$T(n) = n^2 + (n-3)^2 + (n+6)^2 +$	t1.
let.	
$K^{n}-3k=1$ .	
K = (n-1)/3 total terms = k+1	•
$T(M) = N^2 + (N-3)^2 + (N-6)^2 +$	+ <b>1</b>
The ten) = kn2	Ç:
$T(n) \simeq (k+1)/3 - n^2$ .	
So comba (- ji) a galiji	
$T(n) = O(n^3) Ans.$	
C-10 As given wand c	
Relationship b fw nk gc n is	
$n^{k} = 0$ (cn)	
$n^{k} = 0 (c^{n})$ $n^{k} \leq a(c^{n})$	(C)
$n^{k} = 0 (c^{n})$ $n^{k} \leq a(c^{n})$ $t^{n} \geq n_{o} \neq constant, a > 0$	IC.
As given $n^{k}$ and $c^{n}$ Relationship $b \neq w$ $n^{k} \neq c^{n}$ is $n^{k} = 0$ ( $c^{n}$ ) $n^{k} \leq a(c^{n})$ $t^{k} \leq n^{k}$ $t^{k} \leq n$	
$n^{k} = 0$ (cn) $n^{k} \leq a(cn)$ $t \leq n \leq n$ $t \leq n \leq$	
$n^{k} = 0$ (cn) $n^{k} \leq a(c^{n})$ $t \leq n \leq n$ $t \leq $	
$f \Rightarrow 1^{k} \langle a^{2} \rangle$	
$n^{k} = 0 (c^{n})$ $n^{k} \leq a(c^{n})$ $t \leq n \leq $	
$f \Rightarrow 1^{k} \langle a^{2} \rangle$	

 $\max_{2k} |evel_{2k} = n = 1$  $=k=\log_2 n$  $T(n) = c(n^2 + (5/16)n^2 + (5/16)^2 n^2 + \cdots + (5/16) \log_n$  $T(n) = (n^2 \times 1 \times (1 - (5/16) \log n))$ T(n)= Cn2 x 4 x (1-(5/16) logn)  $T(n) = 6(n^2c)$   $0(cn^2) prs$ j=(n-1)/i times 1+3+5 1+4+7  $\sum_{i=1}^{n} \frac{(n-i)}{i}$ : T(n)= (n-1)+ (n-1)+ (n-1)}+ t(n)=n[1+1/2+1/3+---+1/n]-1x[1+/2+/3+-+/ 3 hlogn-logn

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	$T(n) = O(n\log n) \rightarrow nns$
N-6)	
	-> for
	· Laction Company
	$2^{k}$ where $2^{k}$ $2^{k}$ $2^{n}$
	2k 2km < =n
	$2K^2$ $K^m = logn$
	$2^{k^2} \qquad k^m = \log n$ $2^{k^3} \qquad m = \log k \log n$
	m way change
	2 km
	· · · · · · · · · · · · · · · · · · ·
	i=l
	2+1+2 m limes.
	$\frac{2+j+2n \text{ times}}{T(n)=O(\log_{\kappa}\log_{n})}  \text{Ans}$
0-9)	
Q - //	> C- 0 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2
	→ Giner algorithm divides away in 999, 2 1% part : T(n)=T(n-1)+O(1)
	f(n) = f(n-1) + O(1)
	$\sim$ 7
	n-1 $2$ .
~	Pevels / 2.
	<u></u>
	n' work is done at each level.
	n' work is done at each tive.
	$T(n) = (t(n-1)+t(n-2)++t(1)+o(1)) \times \eta$
	= NXN
	$= n \times n$ $= (T(n) = O(n^2))$

DATE lowest height = 2. highest height = n. :. difference = n-2. 08 n>1 The given algo producestinear result.