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h)	def find-complexity2(n):
2	for i in range (n//2, n+1):
	for i in mar (1 1 (1))
	for j in range (1,n-(n//2)+1):
	while k<=n:
	K*=2
	return
	(C (G))
7	Pages of it is believed to the soul
7	Range of i 7 is between n to n+1
	ie n+1-n
	2
	$=$ \underline{n} $+$ 1 \cdots \underline{n}
-	9
-	dimilarly, range of j is in between 1, n-(n/2)+1
	$\frac{\text{similarly}, \text{range}}{\text{ie} n - \underline{n} + 1 - 1}$
	2
PC .	<u> </u>
	0
	For while loop, the complexity is logn since $k = 2$
	since $k \neq 2$
	- loan 3
	since $k = 2$ = logn ··· - 3 combining equations D, 2, 3 $\frac{n+1}{2}$ logn
	$(n+1)n \log n$
	2 / 2
	$= \left(\frac{n^2 + n}{4}\right) \log n$
	$= \frac{n^2 \log n + \frac{m}{2} \log n}{4 \log n}$
	Time complexity = $O(n^2 \log n)$
	: Time complexity

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Q2	c)	def find-complexity3(n):
		if (n<=2):
		return 1
		elre:
		return find-complexity3 (math.floor(
		math. sqrt (n))+1)
=	7	for values of n72 -
		TCM) = T Kan X * Augu
	-	TALL
		$T(n) = T(\sqrt{n}) + 1$
		$= \uparrow (n^{1/2}) + \bot$
		for variable term x,
		$T\left(\frac{1}{n^{2}}\right) + \chi$
		Elge will execute until n=2
		2
		n2x
	11	Taking log on both rider
	1 10 10	log 1 = log 2 log n ²² -2*/log x 7 / log/4
	li I	109 h
	-	: - 2 m/ log x 7 / 1/0 m/4
		2-X 1 - 2 - 1 - 2 - 1 - 2 - 2
		$\frac{2^{-2} \log n}{\log 2} = \log 2$
		$\frac{1}{2^{\chi}} \log n = \log^2 = 2^{\chi} = \log_2 n$
		$x = \log \log n$ $x = \log (\log n)$
		$\chi = \frac{109 (x09)}{100}$
		log 2
		Time complexity = O(log-logn)
		. Time complexity = O(log.logn)

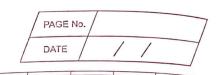
(3) i) $f(n) = 5n^3 + 2n^2 + 7n + 1 \approx 0(n^3)$ for $f(n) \approx O(n^3)$ f(n) = O(g(n)) - To proveie $O \le f(n) \le (g(n))$, where $n > n_0 1$ $f(n) \le (g(n)) + f(n) \le (g($ $f(n) \in (5+2+7+1) n^3$: f(n) ≤ 15n3 :. C = 15, en = 1 parent $f(n) \in O(n^3)$... from 1), Hence proved. ii) $f(n) = 5n^3 + 2n^2 + 7n + 1 + 0 (n^3)$ f(n) = 0 (q(n)) - To prox for C170, C270, no 70f(n) 0 < c, g(n) < f(n) < c, g(n) $5n^3 \leq 5n^3 + 2n^2 + 7n + 1 \leq 5n^3 + 2n^3 + 7n^3 + n^3$ $5n^3 \leqslant f(n) \leqslant (5+2+7+1) \cdot n^3$ $5n^3 \leq f(n) \leq 15n^3$ i. c₁=5, c₂=15, m₀=1 $f(n) \in O(n^3)$... from 1), Hence proved $(52)^{\circ})f(n) = 5n^3 + 2n^2 + 7n + 1 \in \omega(n^2)$ $f(n) = \omega(g(n)) - To \text{ prove}$ ie $0 \le c \cdot g(n) < f(n)$, where $n \ge n_0$ $f(n) = 5n^3 + 2n^2 + 7n + 1$ where, $g(n) = n^2$ \vdots $cg(n) < 5n^3 + 2n^2 + 7n + 1$ \vdots $cn^2 < 5n^3 + 2n^2 + 7n + 1 \dots 0$ For $(=1, n=n_0=1)$ above eq n satisfy condition, $f(n) \in \omega(n^2)$, Hence proved.

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Given - steps of Flich are increased 06 Assumption - steps increased in 2 exponential Ex- x,2x,4x... nx ie x(1,2,4...gnx) Elnich har to return to inital position after travening initial path. .. The pattern is in geometric progression -Sn = a(x -1) $= 2\left(\frac{1(2h-1)}{2-1}\right), \text{ where } 2^{n} \approx h$ = 2 (n-1)Similarly, For route on other half of the road -(2n-2)+(2n-2)z= 4n-4= 4 (n-1) 7 JY (16) -: time complexity = o(n)