

This graph shows that the naive algorithm is faster for smaller bit sizes but as the bit size grows, it becomes less efficient to use than the Karatsuba algorithm (i.e. the Karatsuba algorithm is asymptotically faster than the naive algorithm). This is because there are less recursive calls in the Karatsuba algorithm so when the bit size grows the number of recursive calls starts to add up and makes the naive algorithm slower.

0	Question 2	Olivia Woodhase
	Master Thorem:	
	If T(n) = aT(n/b) + O(nk) where a>0,6>1, and k>0	
	(Q(nk) if K>log, o	T(n) = aT (n/b) +f(n)
	T(n) = > O(n logn) if K = loglo	$ \leftarrow \tau(n) = \Theta(n^k) $ if $f(n) = O(n^{-\epsilon}), e>0$
	O(nlogoa) if K(logo	2) O(n log n) it +(n)= E(n log n)
		O(f(n)) if f(n=Ω(n**E), E>Oandif a(f(n))) & (f(n), c()
	(a) T(n) = 25.T(====================================	A CONTROL OF THE STATE OF THE S
	a=25, b=5, f(n)=n, k=109.525= $e=2-1(f(n)=0(n^{2-(2-1)})=0(n)$	2 mart at a first property
	$8 = 2 - 10 + (m) = 0 (n^2) = 0 (n)$ $\therefore T(n) = \Theta(n^2)$	F FLAT (ISS)
	(n)-Qn	
	(b)T(n)=2.T(3)+nlogn	Case 3: 1st, f(n) = 12 (nlog32+(1-log32))
	$a=2$, $b=3$, $f(n)=n^2\log^2 n$, $k=\log 3$	
	Tim= O(nlogn)	2nd, 2. (3 log(3)) (0 nlogn
		$C = \frac{2}{3} \langle 1 \rangle$
1 17 10	(c) $T(n) = +(\frac{3n}{4}) + 1$	$a=1,b=\frac{4}{3},f(n)=1$
Jack Park	$a=1, b=\frac{4}{3}, K=0$	'f(b) = O(n°log°n)
	109413 1 = 0 = K	:. T(M= O(n° log'n)= O(logn)
A 18-16	: T(n) = O(n° logn) = O(logn)	· · · · · · · · · · · · · · · · · · ·
	$(d) T(n) = 7 \cdot T(\frac{n}{3}) + n^3$	$a=7, b=3, f(h)=n^3, k=10a=7$ $157, f(n) = 51, (h^{10}g_37 + (2-10g_37))^3$
9/	a=7, b=3, K=3	15th f(n) = 12 (n 1092++ (2-1093+)
Wash and	10937× 1.77124374 4 K	let ε = 2-log 37 ✓
	$\therefore T(h) = \Theta(n^3)$	2nd 7. (3)3 4 C. N3
NOVER THE A		±.n° ≤ c.n3
Berger	(e) T(m=T(n/2)+n(2-cosn) = 2n-ncosn = 1, b=2, f(n)=n(2-cosn), K=1	so c= ₹ 41 ✓
	(=1, b=2, f(n)=n(2-cosn), K=1	log_1=0: T(n)=0(n3)
184	13+ f(n) = 1 (nk+E) = 12(no+1) = 12	
	Let E=1	*note: O(h(2-cos(n)) is basically O(n)
	$2^{nd} \cdot 1 \cdot (\frac{n}{2})(2 - \cos \frac{n}{2}) \le c \cdot n(2 - co)$	
AND THE RESERVE	$n - \frac{n}{2}\cos\frac{n}{2} \le C \cdot (2n - n\cos n)$	⇒C≥3/1: not solvable C. (4TK-2TKCOS2TK) by Master Thm!!
	Consider n=2TK => 2TK- TKCOS(TK)	C. (4TK-2TK COS 2TK) DY MILES (1917)
THE WALL BY	(그러리) 하면 그는 이번 있다. 그는 이번 없는 사람들은 이 점점을 하는데 적하다고 하다.	[14 PH L. D. 1974] L. T.

	Question 3	
	To and To are two function	s returning running time
	of alg's A and B defined b	the recursions Ta(n)=7Ta(12)+n2
	and Te(n)=aTe(+)+n² → largest value of a for which	aig B is asympotically faster than A
	$T_{A}(n) = 7T_{A}(\frac{h}{2}) + n^{2}$	CASE 1:
	a=7, b=2 <-1	$a=7, b=2, f(n)=n^2, K=2.807$
	100=7 \$ 2.80735492205760>2	E=0.807 satisfies 0(nk-E)
	the first of the control of the second second second	then, T(D)=O(n*)
	the second section of the second section of the second	K=log27
	men to the state of the series of	: T(n)= Q(n10gz7)
	Tp(n)= < Tp (1/2) - n2	
* *	a=d, b=4, k=2	
e di serig	find is the Same = also case 1	⇒ CASE1: (check)
	So need to find of such that	a=48, b=4, f(n)=n2, K=109448
	(n1094a) < O(n10927)	E= 0.7 9248 satisfies 0(10 x-2)
	80 Togga (10927)	Thun, T(n)=O(n*)
	let 0 = 48	4 K=10944870 m
	10944872.79248125 which is less th	van 16927 : T(b)=0(Hlogy448)
1 - 1 - 1 -	let of = 49 11	
	109449×2:80735492 too high!	which is a sypotically faster
	Had the the Carles of the Control of the Control	The transfer of the transfer o
	and the second s	
		No. of the state o
HE WAY	· 医等级性医皮肤 经产业的 1000 1000 1000 1000 1000 1000 1000 10	
de la la	Therefore, $\alpha = 48$	The first of the property by the property beautiful to the said
	Personal and the second of the	
		the same way the company of the same of the same

Land of the

pant in the