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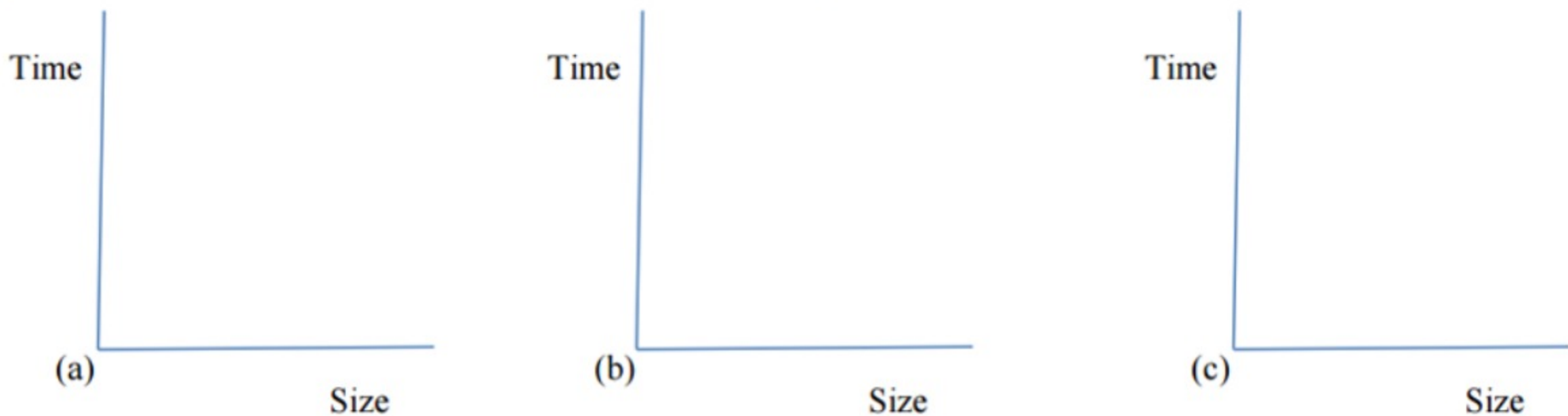
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Question: Sketch approximate Size vs. Time curves for the two algorithmi...

Python Complexity Classes and Big-O Notation

1. (3 pts) Sketch approximate Size vs. Time curves for the two algorithmic complexity classes required in each of the pictures below: for one, write **Impossible** instead: (a) an $O(N)$ algorithm that is **never** faster than an $O(N^2)$ algorithm. (b) an $O(N)$ algorithm that is **always** faster than an $O(N^2)$ algorithm. (c) an $O(N)$ algorithm that is **sometimes** faster than an $O(N^2)$ algorithm.



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Expert Answer



Anonymous answered this
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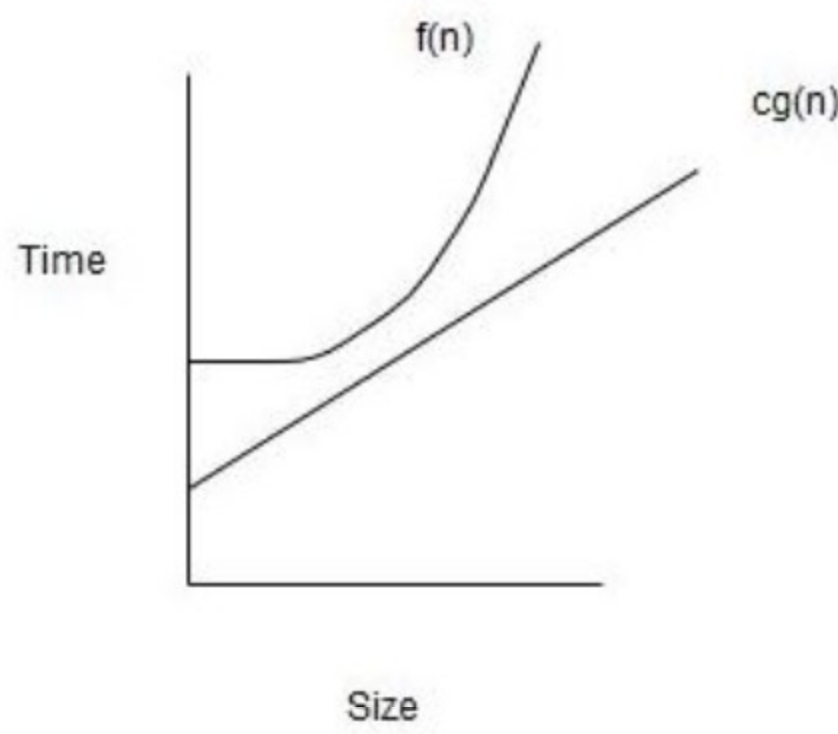
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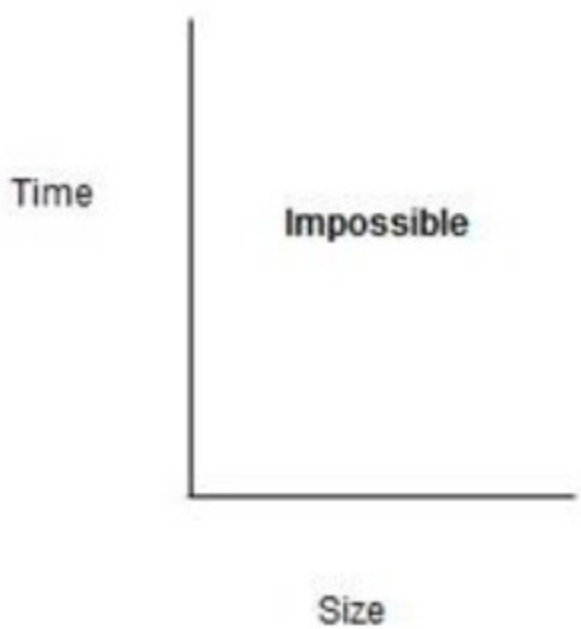
Solution:

The graph for each case is shown below:

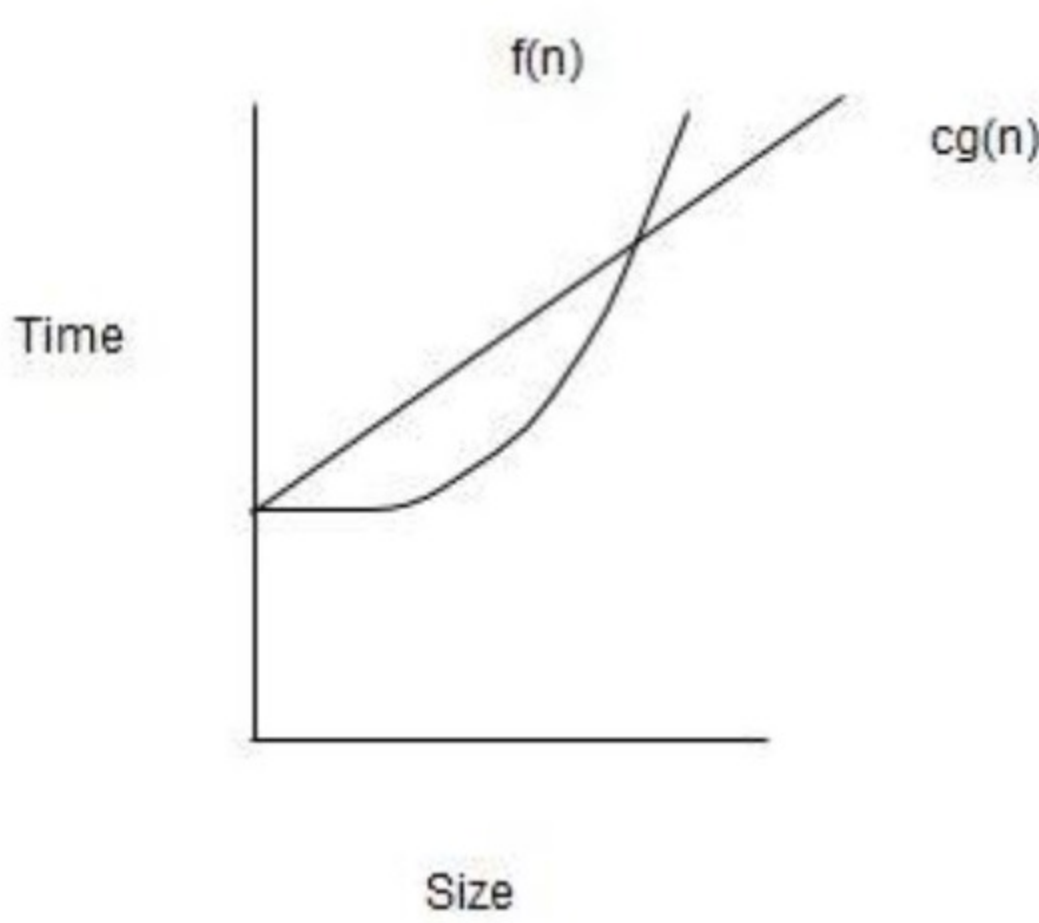
(a) $O(N)$ algorithm that is never faster than an $O(N^2)$ algorithm



(b) $O(N)$ algorithm that is always faster than an $O(N^2)$ algorithm



(c) $O(N)$ algorithm that is sometimes faster than an $O(N^2)$ algorithm



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Up next for you in Computer Science

Fill in the last line of the three empty rows, which shows the size of a problem can be solved in the same ...

4. (3 pts) Fill in the last line of the three empty rows, which shows the size of a problem can be solved in the same amount of time for each complexity class on a new machine that runs nine as fast as the old one. Solve by hand when you can, and find it or a calculator when you must. I used a calculator only for $O(N \log N)$ and solved it to 3 significant digits. Solving a problem in the same amount of time on the new machine is equivalent to solving a problem that takes nine times the amount of time on the old machine. See $O(N)$ for an example.

N = Problem Size	Complexity Class	Time to Solve on Old Machine (secs)	N Solvable in the same Time on a New Machine 9x as Fast
10^2	$O(\log N)$	1	
10^2	$O(N)$	1	9×10^2
10^2	$O(N \log N)$	1	

See answer

Assume that function f is in the complexity class $O(\text{Squareroot } N \log_2 N)$, and that for $N = 1,000,000...$

5. (4 pts) Assume that function f is in the complexity class $O(\sqrt{N} \log_2 N)$, and that for $N = 1,000,000$ program runs in .06 seconds.

(1) Write a formula, T(N) that computes the approximate time that it takes to run f for any input N. Show your work/calculations by hand, approximating logarithms, final/simplify all the arithmetic.

(2) Compute how long it will take to run when $N = 4,000,000$. Show your work/calculations approximating logarithms, final/simplify all the arithmetic.

See answer

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Q: PYTHON 3: Analysis of Algorithms/ Complexity classes Sketch Size vs. Time curves for the two algorithmic complexity classes required in each of the pictures below: for one, write Impossible instead: (a) an $O(N)$ algorithm that is never faster than an $O(N^2)$ algorithm. (b) an $O(N)$ algorithm that is always faster than an $O(N^2)$ algorithm. (c) an $O(N)$ algorithm that is sometimes faster...

A: See answer 100% (2 ratings)

Q: python

A: See answer

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