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### Question: 5. (5 pts) Assume that function f is in the complexity class $O(N \log N)$ (l...

python  
n log n algorithms

5. (5 pts) Assume that function **f** is in the complexity class  $O(N (\log_2 N)^2)$ , and that for **N = 1,000** the program runs in **10 seconds**.

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

(2) Compute how long it will take to run when **N = 1,000,000** (which is also written  $10^6$ ). Show your work/calculations by hand, approximating logarithms, finish/simplify all the arithmetic.

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### Expert Answer 1



anonymous answered this  
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1

1

$$T = k * n(\log_2 n)^2$$

On putting n=1000 and T=6 we get

$$10 = k * 1000(\log_2 1000)^2$$

$$k = 1.0006 * 10^{-4}$$

And Hence we get the formula

$$T = 1.0006 * 10^{-4} * n(\log_2 n)^2$$

Q2

Hence on putting n=1000000

we get

$$T = 1.0006 * 10^{-4} * 10^6(\log_2 10^6)^2$$

$$T = 39750.58$$

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### Practice with similar questions

Q: Assume that method m is in the complexity class  $O(N \log_2 N)$ , and that for **N = 1,000** the program runs in **4 seconds**.  
(a) write a formula, **T(N)** that computes the approximate time that it takes to run m for any inout of size **N**. Show your work/calculations by hand, approximating logarithms, finish/simplify all the arithmetic. (b) Compute how long it will take to run when **N = 1,000,00...**

A: See answer 100% (1 rating)

Q: 5. (5 pts) Assume that function f is in the complexity class  $O(N (\log_2 N))$ , and that for **N = 1,000** the program runs in **10 seconds**. (1) Write a formula, **T(N)** that computes the approximate time that it takes to run f for any input of size **N**. Show your work/calculations by hand, approximating logarithms, then finish/simplify all the arithmetic. (2) Compute how long it will take to run...

A: See answer 100% (3 ratings)

### Up next for you in Computer Science

4. (6 pts) The following functions each determine if any two values in alist sum to asum. As is shown in the...

```
4. (6 pts) The following function each determine if any two values in alist sum to asum. As is shown in the
sums, (a) write the complexity class of each statement on its right, where # is the value of #. (b) Write the full
calculations that compute the complexity class for the entire function. (c) Simplify, when you want to. (d)
def sum_to_2 (alist,asum):
    for i in alist:
        for j in alist:
            if i+j == asum:
                return (i,j)
    return None
(b)
(c)
```

See answer

7c. (5 pts) Write the complexity class of each algorithm, assuming the required data structure stor...

```
7c. (5 pts) Write the complexity class of each algorithm, assuming the
(1) Remove the value at the middle of a linked list (assuming
(2) Use binary search to determine whether a value is in a v
(3) Remove the 10 smallest values in a list by repeatedly
(4) Remove the N/2 smallest values in a list by repeatedl
(5) Remove the N/2 smallest values in a list by sorting it
```

See answer

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### Questions viewed by other students

Q: Assume that function f is in the complexity class  $O(\text{Square root } N \log_2 N)$ , and that for **N = 1,000,000** the program runs in **06 seconds** Write a formula, **T(N)** that computes the approximate time that it takes to run f for any input of size **N**. Show your work/calculations by hand, approximating logarithms, finish/simplify all the arithmetic. Compute how long it will take to run when **N...**

A: See answer 100% (3 ratings)

Q: 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, use Excel or a calculator when you must: I used a calculator only for  $O(N \log_2 N)$  and solved it to 3 significant digits. Solving a problem in the same...

A: See answer 100% (5 ratings)

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