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shengtatng ~

★ Course / Unit 6: Algorithmic Complexity / 11. Computational Complexity

Discussion

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Exercise 2

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Finger Exercises due Oct 27, 2022 07:30 +08 Completed

Exercise 2

6/6 points (graded)

ESTIMATED TIME TO COMPLETE: 12 minutes

For the following programs, fill in the best-case and the worst-case number of steps it will take to run each program.

For these questions, you'll be asked to write a mathematical expression. Use +, -, / signs to indicate addition, subtraction, and division. Explicitly indicate multiplication with a * (ie say "6*n" rather than "6n"). Indicate exponentiation with a caret (^) (ie "n^4" for n^4). Indicate base-2 logarithms with the word log2 followed by parenthesis (ie "log2(n)").

1. Program 1:

```
def program1(x):
    total = 0
    for i in range(1000):
        total += i

while x > 0:
        x -= 1
        total += x
```

What is the number of steps it will take to run Program 1 in the best case? Express your answer in terms of n, the size of the input x.

```
3003
```

What is the number of steps it will take to run Program 1 in the worst case? Express your answer in terms of n, the size of the input x.

```
5*n + 3003 \checkmark 5 \cdot n + 3003
```

2. Program 2:

```
def program2(x):
    total = 0
    for i in range(1000):
        total = i

while x > 0:
        x = x//2
        total += x

return total
```

What is the number of steps it will take to run Program 2 in the best case? Express your answer in terms of n, the size of the input x.

```
2003
```

What is the number of steps it will take to run Program 2 in the worst case? Express your answer ir of n, the size of the input x.



```
5*log2(n) + 2008 5 \cdot log_2(n) + 2008
```

3. Program 3:

```
def program3(L):
    totalSum = 0
    highestFound = None
    for x in L:
        totalSum += x

for x in L:
    if highestFound == None:
        highestFound = x
    elif x > highestFound:
        highestFound = x

return (totalSum, highestFound)
```

What is the number of steps it will take to run Program 3 in the best case? Express your answer in terms of n, the number of elements in the list \Box .



What is the number of steps it will take to run Program 3 in the worst case? Express your answer in terms of n, the number of elements in the list L.

```
7*n + 2
7 \cdot n + 2
```

Reminder: You do not lose points for trying a problem multiple times, nor do you lose points if you hit "Show Answer". If this problem has you stumped after you've tried it a few times, feel free to reveal the solution.

Click the "Reset" button to clear your answers.

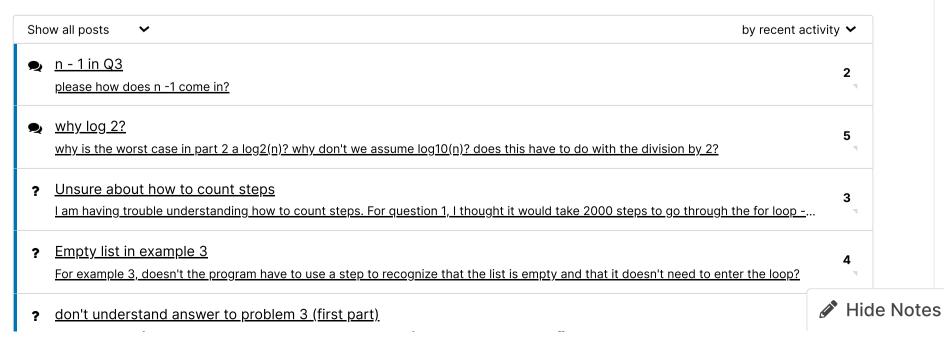
Submit

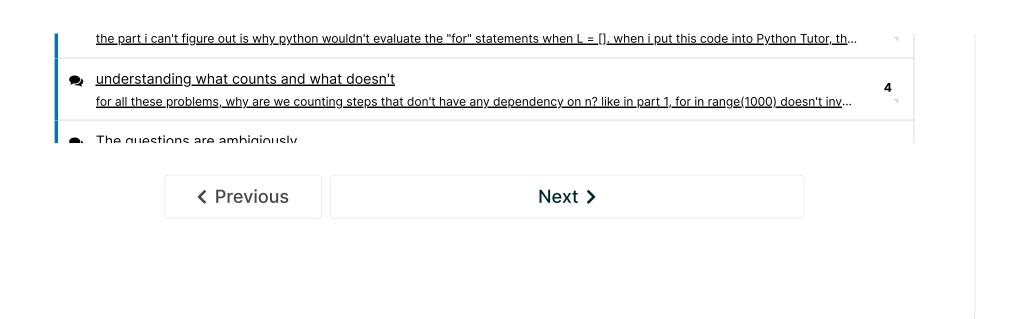
Exercise 2

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