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## Exercise 2

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### 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

    return total
```

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 .



$1 + 3 \cdot 1000 + 1 + 1$

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  $x$ .

$$1 + 3 \cdot 1000 + n \cdot 5 + 1 + 1$$



$$1 + 3 \cdot 1000 + n \cdot 5 + 1 + 1$$

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  $x$ .

$$1 + 2 \cdot 1000 + 1 + 1$$



$$1 + 2 \cdot 1000 + 1 + 1$$

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

$$1 + 2 \cdot 1000 + (\log_2(n) + 1) \cdot 5 + 1 + 1$$



$$1 + 2 \cdot 1000 + (\log_2(n) + 1) \cdot 5 + 1 + 1$$

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  $L$ .



3

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  $L$ .



$2 + n \cdot 3 + 3 + (n - 1) \cdot 4 + 1$

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

✓ Correct (6/6 points)

## Exercise 2

Show Discussion

**Topic:** Lecture 11 / Exercise 2

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