

MITx: 6.00.1x Introduction to Computer Science and Programming Using Python

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## L9 PROBLEM 1 (5/5 points)

Here is some code from lecture:

```
def linearSearch(L, x):
for e in L:
    if e == x:
        return True
return False
```

Choose which of the following inputs to linearSearch would give the best case, average case, or worst case run time.

## 1. Best Case Run Time

- linearSearch([14, 15, 6, 27, 13, 16, 25, 11, 7], 15)
- linearSearch([21, 1, 25, 22, 30, 13, 7, 24, 12], 24)
- linearSearch([20, 10, 1, 7, 4, 22, 25, 12, 31], 20)
- linearSearch([9, 3, 12, 24, 7, 8, 23, 11, 19], 8)
- linearSearch([4, 12, 20, 17, 9, 14, 7, 24, 6], 7)
- linearSearch([13, 9, 22, 3, 10, 17, 11, 2, 12], 26)

## 2. Worst Case Run Time

- linearSearch([14, 15, 6, 27, 13, 16, 25, 11, 7], 15)
- linearSearch([21, 1, 25, 22, 30, 13, 7, 24, 12], 24)
- linearSearch([20, 10, 1, 7, 4, 22, 25, 12, 31], 20)
- linearSearch([9, 3, 12, 24, 7, 8, 23, 11, 19], 8)
- linearSearch([4, 12, 20, 17, 9, 14, 7, 24, 6], 7)
- linearSearch([13, 9, 22, 3, 10, 17, 11, 2, 12], 26)

# 3. Average Case Run Time

- linearSearch([14, 15, 6, 27, 13, 16, 25, 11, 7], 15)
- linearSearch([21, 1, 25, 22, 30, 13, 7, 24, 12], 24)
- linearSearch([20, 10, 1, 7, 4, 22, 25, 12, 31], 20)
- linearSearch([9, 3, 12, 24, 7, 8, 23, 11, 19], 8)
- linearSearch([4, 12, 20, 17, 9, 14, 7, 24, 6], 7)
- linearSearch([13, 9, 22, 3, 10, 17, 11, 2, 12], 26)
- 4. What is the number of steps it will take to run linearSearch in the best case? Express your answer in terms of *n*, the number of elements in the list L.

Indicate addition and multiplication explicitly, with + and \* symbols. Indicate exponentiation with the caret ( ^ ) symbol.

1

Answer: 1

## **EXPLANATION:**

In the best case scenario, L is an empty list. Thus one step is taken: return False.

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

Indicate addition and multiplication explicitly, with + and \* symbols. Indicate exponentiation with the caret (^) symbol.

2\*n+1

 $2 \cdot n + 1$ 

**Answer:** 2\*n + 1

## **EXPLANATION:**

In the worst case scenario, x is not present in L. Thus we go through the for loop n times. This means we execute assignment of e to each element of L (this takes place in the line f or e in L) to enter the f or loop, and also execute the check

if e == x:

once each for every element. So this is 2\*n steps. Finally at the end of the for loop, we execute the return statement one time.

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.

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