

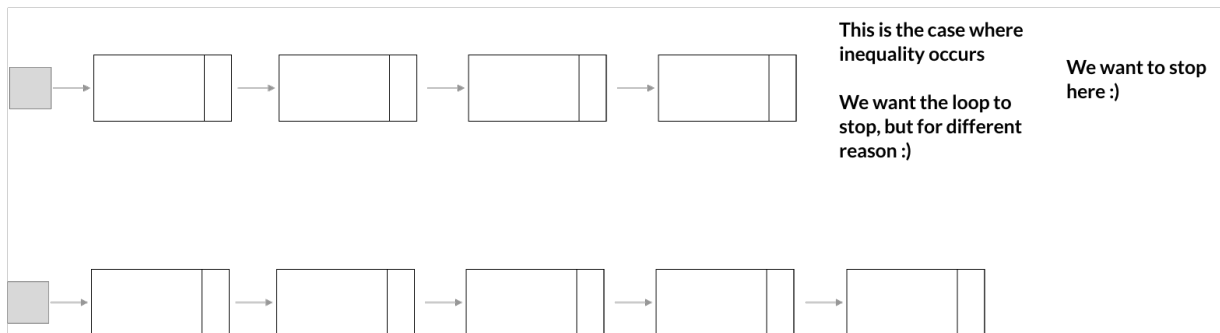
CSC148 Worksheet 13 Solution

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Question 1

- a. The following diagram tells us the stopping condition occurs when both *curr1* and *curr2* is *None*.

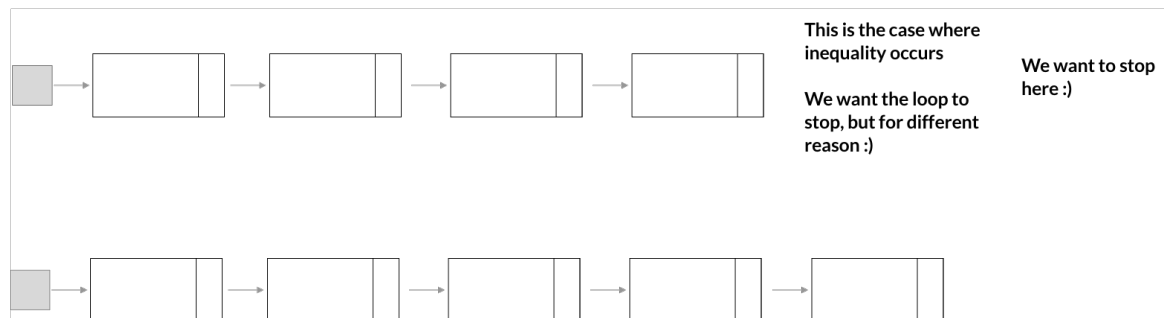


Using this fact, the python expression involving *curr1* and *curr2* that expresses the stopping condition is

```
1 (curr1 is not None) and (curr2 is not None)
2
```

Correct Solution:

The following diagram tells us the stopping condition occurs when both *curr1* and *curr2* is *None*.



Using this fact, the python expression involving *curr1* and *curr2* that expresses the stopping condition is

```
1 (curr1 is None) and (curr2 is None) # <- Correct Solution
2
```

b. Python expression for the while loop condition is

```
1 while (curr1 is not None) and (curr2 is not None):
2     ...
3
```

c. The code for traversing two list is

```
1 while (curr1 is not None) and (curr2 is not None):
2     if curr1 is None or curr2 is None:
3         return False
4
5     if curr1.item != curr2.item:
6         return False
7
8     curr1 = curr1.next
9     curr2 = curr2.next
10
```

d. After the loop ends, we know all items in *curr1* and *curr2* are identical.

e. Because we know on successful loop termination, all items in *curr1* and *curr2* are the same, we can use this information to conclude the two linked lists have the same length.

f. The code that should go after the end of while loop is

```
1 return True
2
```

Correct Solution:

The code that should go after the end of while loop is

```
1     return curr1 is None and curr2 is None # <- Correct solution
2
```

```
1 def __eq__(self, other: LinkedList) -> bool:
2     """Return whether this list and the other list are equal.
3
4     >>> lst1 = LinkedList([1, 2, 3])
5     >>> lst2 = LinkedList([])
6     >>> lst1.__eq__(lst2)
7     False
8     >>> lst2.append(1)
9     >>> lst2.append(2)
10    >>> lst2.append(3)
11    >>> lst1.__eq__(lst2)
12    True
13    """
14    curr1 = self._first
15    curr2 = other._first
16
17    while (curr1 is not None) and (curr2 is not None):
18        if curr1 is None or curr2 is None:
19            return False
20
21        if curr1.item != curr2.item:
22            return False
23
24        curr1 = curr1.next
25        curr2 = curr2.next
26
27    return curr1 is None and curr2 is None
```

Listing 1: worksheet_13.q1_solution.py

Question 2

a. Initially, *curr* and *i* are as follows

```
1     curr = self._first
2     i = 0
3
```

b. The stopping condition for the while loop is

```
1     curr is not None
2
```

Using this fact, we can conclude that the while loop condition is

```
1 while curr is not None:
2     ...
3
```

Correct Solution:

The stopping condition for the while loop is

```
1 (curr is None) or (i > index) # <- Correct solution
2
```

Using this fact, we can conclude that the while loop condition is

```
1 while (curr is not None) and (i <= index): # <- Correct Solution
2     ...
3
```

c. The code for the loop body is

```
1 # 2. If index - 1 != current_index, then continue to next node
2 if index - 1 != current_index:
3     curr = curr.next
4     current_index += 1
5     continue
6
7 # 3. If curr.next is none, then let it terminate naturally
8 if curr.next is None:
9     curr = curr.next
10    current_index += 1
11    continue
12
13 # 4. If index - 1 == current_index, then return item of curr.next
14 return curr.next.item
15
```

Correct Solution:

The code for the loop body is

```
1     # 1. If index == 0, then return curr.item
2     if index == 0:
3         return curr.item
4
5     # 2. If index - 1 != i, then continue to next node
6     if index - 1 != i:
7         curr = curr.next
8         i += 1
9         continue
10
11    # 3. If curr.next is none, then let it terminate naturally
12    if curr.next is None:
13        curr = curr.next
14        i += 1
15        continue
16
17    # 4. If index - 1 == i, then return item of curr.next
18    return curr.next.item
19
```

- d. After the loop ends, we know *curr* is None and *index* == *len(self)*.

Using this fact, we can write that the post-loop code is

```
1     raise IndexError
2
```

Correct Solution:

After the loop ends, we know *curr* is None or *i* > *index*.

Since both mean the index is out of bound, we can write that the post-loop code is

```
1     raise IndexError
2
```

```

1  def __getitem__(self, index: int) -> Any:
2      """Return the item at position <index> in this list.
3      Raise an IndexError if the <index> is out of bounds.
4      Precondition: index >= 0.
5
6      >>> lst = LinkedList([1, 2, 3])
7      >>> print(lst[0])
8      1
9      >>> print(lst[1])
10     2
11     >>> print(lst[2])
12     3
13     >>> print(lst[3])
14     Traceback (most recent call last):
15         ...
16     IndexError
17     """
18
19     curr = self._first
20     i = 0
21
22     while (curr is not None) and (i <= index):
23         # 1. If index == 0, then return curr.item
24         if index == 0:
25             return curr.item
26
27         # 2. If index - 1 != i, then continue to next node
28         if index - 1 != i:
29             curr = curr.next
30             i += 1
31             continue
32
33         # 3. If curr.next is none, then let it terminate naturally
34         if curr.next is None:
35             curr = curr.next
36             i += 1
37             continue
38
39         # 4. If index - 1 == i, then return item of curr.next
40         return curr.next.item
41
42     raise IndexError

```

Listing 2: worksheet_13_q2_solution.py