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Homework 1

1.

I would merge two lists by adding them together using the line of code “a+b” where a is list 1 and b is list 2. That would create a complexity of O(a*(len(a)+len(b))), which simplifies down to O(len(a)+len(b)). The reason for this is because Python is creating an entirely new empty list in memory which is the length of len(a)+len(b), multiplied by the resizing constant of a. Once the empty list is created, Python needs to copy over the elements from the lists, which will take O(len(a)) to copy list a, and O(len(b)) to copy list b, which will take O(len(a)+len(b)) total for this action.

2.

a.

keep track of longest sequence
keep track of sequence we are currently adding to
For loop iterating over all items in list
  add to sequence if list[i]> list[i-1]
  if list[i]<=list[i-1]
    update longest sequence if necessary
    set new working sequence to list[i]
Once we get to end of list, update longest sequence to current sequence if necessary
Return longest sequence

b.

Create 2 empty lists O(1)
For loop O(n) where n is the length of the list
If statement O(1)
Append to list O(1) unless it resizes
If statement O(1)
Reassign a list O(1) unless it resizes
Reassign another list O(1)
If statement O(1)
Reassign a list O(1) unless it resizes
Return statement O(1)

Total is O(n) where n is the length of the initial list