12/11/20

12/29/20

1/9/21, 1/25/21

2/17/21

Leetcode:

1. Array-based
2. Link-list

Review + new problem

**Need\_to\_review:**

* for i,n in enumerate(**itertools.accumulate**(nums)

1. **Array - based**
2. **1054: Distant Barcode**

**Input:** barcodes = [1,1,1,1,2,2,3,3]

**Output:** [1,3,1,3,1,2,1,2]

Rearrange the barcodes so that no two adjacent barcodes are equal.

1. Use heapq as **priority Q**.
2. def rearrangeBarcodes(self, barcodes: List[int]) -> List[int]:
3. # 9:53 --> 10:00 --> 10:12 12/11/20
5. cnter = collections.Counter(barcodes)
6. pq = []
8. for v, cnt in cnter.items():
9. heapq.heappush(pq, [-cnt, v])
11. res = []
12. while pq:
13. top = heapq.heappop(pq)
14. res.append(top[1])
15. if pq:
16. top\_next = heapq.heappop(pq)
17. res.append(top\_next[1])
18. top\_next[0] += 1
19. if top\_next[0] < 0:
20. heapq.heappush(pq, top\_next)
22. top[0] += 1
23. if top[0] < 0:
24. heapq.heappush(pq, top)
26. return res
27. **229. Bulls and Cows**

**Input:** secret = "1807", guess = "7810"

**Output:** "1A3B"

Use collections.Counter()

Two Linear Scans

1. **Increasing Subsequences**
2. **300. Longest Increasing Subsequence**

Simply dp.

**dp = [1] \* n**

**max\_len = 1**

# Recursive back-track

**for i in range(n):**

**for j in range(i):**

**if nums[i] > nums[j]:**

**len\_new** = dp[j]+1

**dp[i]** = len\_new if len\_new > dp[i] else dp[i]

**max\_len** = max(max\_len, dp[i])

**return max\_len**

1. **673. Number of Longest Increasing Subsequence**

def findNumberOfLIS(self, nums: List[int]) -> int:

# 10:43 --> 11:00 --> 11;16 9/1/20 Num of longest increasing subsequence

**dp** = [ **[1, 1]** for i in range(len(nums))]

max\_len = 0

max\_cnt = 0

**for i, num in enumerate(nums):**

**for j in range(i):**

**if num > nums[j]:**

len\_new = dp[j][0] + 1

if len\_new > dp[i][0]:

**dp[i][0**], **dp[i][1]** = len\_new, dp[j][1]

elif len\_new == dp[i][0]:

**dp[i][1]** += dp[j][1]

**if max\_len == dp[i][0]:**

max\_cnt += dp[i][1]

**if max\_len < dp[i][0]:**

max\_len = dp[i][0]

max\_cnt = dp[i][1]

return **max\_cnt**

1. **1546. Maximum Number of Non-Overlapping Subarrays With Sum Equals Target**

* Use cumulative sum as an array, find diff between elements

**DP solution**

def maxNonOverlapping(self, nums: List[int], target: int) -> int:

n = len(nums)

sums = [0]\*n

**res = [0] \* n**

max\_len = 0

**dic = {}**

**# cumulative SUM**

**for i in range(n):**

**sums[i] = sums[i-1] + nums[i] if i > 0 else nums[i]**

**for i, v in enumerate(sums):**

**val = v - target**

if val in dic:

res[i] = res[dic[val]] + 1

elif val == 0:

res[i] = 1

**dic[v] = i**

if i > 0:

res[i] = max(res[i], res[i-1])

return res[n-1]

* **Greedy, best soln**

**dic = {0:1}**

**cnt = 0**

**cur\_sum = 0**

**for num in nums**:

cur\_sum += num

prev\_sum = cur\_sum - target

if prev\_sum in dic:

**cnt += 1**

**dic = {0:1}**

**cur\_sum = 0**

else:

dic[cur\_sum] = 1

return cnt

* **Greedy using set**

**pre\_sum = set([0])**

**cnt = 0**

**cur\_sum = 0**

**for num in nums**:

cur\_sum += num

if cur\_sum - target in pre\_sum:

**cnt += 1**

**cur\_sum = 0**

**pre\_sum.clear()**

**pre\_sum.add(0)**

else:

pre\_sum.add(cur\_sum)

return cnt

1. **Continuous SUM**
2. **523. Continuous Subarray Sum**

* Brute Force

def checkSubarraySum(self, nums: List[int], k: int) -> bool:

# // 6/11/20

n = len(nums)

**for i, v in enumerate(nums):**

total = v

**for j in range(i+1,n):**

total += nums[j]

if k != 0 and total % k == 0:

return True

if k == total == 0:

return True

return False

* Using Dict

 if sum(**nums[i:j]**) % k == 0 for some i < j, then sum(nums[:j]) % k == sum(nums[:i-1]) % k.

 So we just need to use a dictionary to keep track of sum(nums[:i]) % k and the corresponding index i. Once some later **sum(nums[:i']) % k** == **sum(nums[:i]) % k**and i' - i > 1, we return True.

[0,0]

**def checkSubarraySum(self, nums: List[int], k: int) -> bool:**

# // 6/11/20

**dic = {0:-1}**

**sum\_cur = 0**

for i, v in enumerate(nums):

sum\_cur += v

if k == 0:

if i > 0 and v == nums[i-1]==0:

return True

else:

**tmp** = sum\_cur % k

if tmp in dic:

if i - dic[tmp] > 1:

return True

else:

dic[tmp] = i

return False

-----------------------------------------------------------------------------------

**def checkSubarraySum(self, nums: List[int], k: int) -> bool:**

# // 6/11/20

dic = {0:-1}

sum\_cur = 0

for i, v in enumerate(nums):

sum\_cur += v

if k == 0:

if i > 0 and v == nums[i-1]==0:

return True

else:

**sum\_cur = sum\_cur % k**

if sum\_cur in dic:

if i - dic[sum\_cur] > 1:

return True

else:

dic[sum\_cur] = i

return False

def checkSubarraySum(self, nums: List[int], k: int) -> bool:

# // 6/11/20

dic = {0:-1}

summ = 0

for i, n in enumerate(nums):

if k != 0:

summ = (summ + n) % k

else:

summ += n

if summ not in dic:

dic[summ] = i

else:

if i - dic[summ] >= 2:

return True

return False

1. **Bucket Sort**
2. **220 Contains Duplicate III**

* def containsNearbyAlmostDuplicate(self, nums: List[int], k: int, t: int) -> bool:

# nums[i] - nums[j] <= t

# i - j <= k

if t<0 or k<0:

return False

**allBuckets = {}**

**bucketSize = t+1 #**

**#Two benefits for using t+1 as bucket size:**

**# 1. avoid case t = 0**

**# 2.To fit number of t in each bucket**

**for i in range(len(nums)):**

# m is bucket Index for nums[i]

**m = nums[i]//bucketSize**

#if there is a bucket already present corresponding to current number

if m in allBuckets:

return True

#checking two adjacent buckets m, m-1

if (m-1) in allBuckets and abs(nums[i]-allBuckets[m-1])<bucketSize:

return True

#checking two adjacent buckets m, m+1

if (m+1) in allBuckets and abs(nums[i]-allBuckets[m+1])<bucketSize:

return True

**allBuckets[m]= nums[i]**

#removing the bucket corresponding to number out of our k sized window

**if i>=k:**

**allBuckets.pop( nums[i-k]//bucketSize)**

return False

* **Sorting**

def containsNearbyAlmostDuplicate(self, nums: List[int], k: int, t: int) -> bool:

# nums[i] - nums[j] <= t

# i - j <= k

n = len(nums)

**A = list(zip(nums, range(n)))**

**A.sort()**

for i in range(n):

j = i + 1

while j < n and **A[j][0] - A[i][0]** <= t:

if abs(**A[j][1] - A[i][1]**) <= k:

return True

else:

j += 1

return False

* **DefaultDict**

def containsNearbyAlmostDuplicate(self, nums: List[int], k: int, t: int) -> bool:

# 9:59 --> 10:12 7/24/20

# t -> nums[i] - nums[j]

# k => i - j

if k < 1 or t < 0:

return False

dic = **collections.OrderedDict()**

for num in nums:

key = num if t == 0 else num // t

for m in [dic.get(key-1), dic.get(key), dic.get(key+1)]:

if m is not None and abs(num-m) <= t:

return True

if len(dic) == k:

dic.popitem(last=False)

dic[key] = num

return False

1. **Linked List**
2. **1474 Delete N nodes after M nodes of a linked list**

**(if there is less than n nodes to remove at the end, remove them as is)**

**def deleteNodes(self, head: ListNode, m: int, n: int) -> ListNode:**

**# 11:48 --> 11:57 11/28/20**

**res = head**

**while True:**

**for \_ in range(m-1):**

**if head:**

**head = head.next**

**else:**

**break**

**if not head:**

**break**

**tail = head**

**for \_ in range(n+1):**

**if tail:**

**tail = tail.next**

**else:**

**break**

**head.next = tail**

**head = tail**

**return res**

1. **206: Reverse a linked list**

**# Recursive Way**

**def reverseList(self, head: ListNode) -> ListNode:**

**# 9:34 11/18/20**

**if not head or not head.next:**

**return head**

**N = self.reverseList(head.next)**

**head.next.next = head**

**head.next = None**

**return N**

**# Iterative way**

**def reverseList(self, head: ListNode) -> ListNode:**

**# 9:34 11/18/20**

**dummy\_head = None**

**while head:**

**node\_next = head.next**

**head.next = dummy\_head**

**dummy\_head = head**

**head = node\_next**

**return dummy\_head**

1. **21 Merge Two Sorted Lists**

**def mergeTwoLists(self, l1: ListNode, l2: ListNode) -> ListNode:**

**dummy = head = ListNode()**

**while l1 and l2:**

**if l1.val < l2.val:**

**head.next = l1**

**l1 = l1.next**

**else:**

**head.next = l2**

**l2 = l2.next**

**head = head.next**

**if l1:**

**head.next = l1**

**elif l2:**

**head.next = l2**

**return dummy.next**

1. **237. Delete Node in a linked List**

**def deleteNode(self, node):**

**"""**

**:type node: ListNode**

**:rtype: void Do not return anything, modify node in-place instead.**

**"""**

**node.val = node.next.val**

**node.next = node.next.next**

**4.1) 203. Remove Linked List Elements**

**def removeElements(self, head: ListNode, val: int) -> ListNode:**

**# 6:34 11/16/20**

**dummy = ListNode()**

**dummy\_head = dummy**

**dummy.next = head**

**while head:**

**if head.val != val:**

**dummy\_head.next = head**

**dummy\_head = dummy\_head.next**

**head = head.next**

**dummy\_head.next = None**

**return dummy.next**

1. **876. Middle of the Linked List**

**Fast and Slow pointers**

**# if there are Two middle nodes, return the 2nd mid node.**

**def middleNode(self, head: ListNode) -> ListNode:**

**# 11:39 11/18/20**

**slow = fast = head**

**while fast and fast.next:**

**slow = slow.next**

**fast = fast.next.next**

**return slow**

**# if there are Two middle nodes, return the 1st mid node.**

**def middleNode(self, head: ListNode) -> ListNode:**

**# 11:39 11/18/20**

**slow = fast = head**

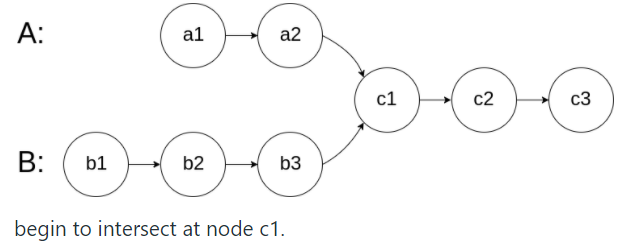
**while fast and fast.next and fast.next.next:**

**slow = slow.next**

**fast = fast.next.next**

**return slow**

1. **160. Intersection of Two Linked Lists**

****

**# 1. Trim the longer one, so both lists can start at the same length.**

**def getIntersectionNode(self, headA: ListNode, headB: ListNode) -> ListNode:**

**# 1/15/21**

**lenA, lenB = 0 , 0**

**A, B = headA, headB**

**while A:**

**lenA += 1**

**A = A.next**

**while B:**

**lenB += 1**

**B = B.next**

**while lenA > lenB:**

**lenA -= 1**

**headA = headA.next**

**while lenB > lenA:**

**lenB -= 1**

**headB = headB.next**

**while headA != headB:**

**headA = headA.next**

**headB = headB.next**

**return headA**

**# 2.**

**def getIntersectionNode(self, headA: ListNode, headB: ListNode) -> ListNode:**

**# 5:38 --> 5:56 --> 11/17/20**

**a, b = headA, headB**

**while a != b:**

**a = a.next if a else headB**

**b = b.next if b else headA**

**return a**

1. **141. Linked List Cycle**

**# (start\_1 + m\_steps % len\_cycle) == (start\_2 + 2\*m\_steps % len\_cycle)**

**#**

**def hasCycle(self, head: ListNode) -> bool:**

**# 5:15 11/17/20**

**slow = fast = head**

**while fast and fast.next:**

**fast = fast.next.next**

**slow = slow.next**

**if fast == slow:**

**return True**

**return False**

**# pre and cur**

**def removeElements(self, head: ListNode, val: int) -> ListNode:**

**# 6:34 11/16/20**

**while head:**

**if head.val == val:**

**head = head.next**

**else:**

**break**

**pre, cur = head, head**

**while cur:**

**if cur.val == val:**

**pre.next = cur.next**

**cur = cur.next**

**else:**

**pre = cur**

**cur = cur.next**

**return head**

1. **Palindrome Linked List**

**def isPalindrome(self, head: ListNode) -> bool:**

**# 8:50 11/16/20**

**# Reverse half and compare**

**#find the head of the second half part**

**fast = slow = head**

**while fast and fast.next:**

**fast = fast.next.next**

**slow = slow.next**

**#slow now is the head of second half**

**#reverse the second half**

**prev = None**

**# Multiple assignment, unpacking**

**while slow:**

**slow.next,slow,prev = prev,slow.next,slow**

**#prev now is the head of reversed second half**

**#compare the first part and the second part**

**while prev:**

**if prev.val != head.val:**

**return False**

**prev, head = prev.next, head.next**

**return True**

**##**

**def isPalindrome(self, head: ListNode) -> bool:**

**# 8:50 11/16/20**

**slow = fast = head**

**rev = None**

**while fast and fast.next:**

**rev, slow.next, slow, fast = slow, rev, slow.next, fast.next.next**

**# rev, rev.next, slow, fast = slow, rev, slow.next, fast.next.next**

**if fast: slow = slow.next**

**while slow and slow.val == rev.val:**

**slow, rev = slow.next, rev.next**

**return not slow**

1. **369. Plus One Linked List**

**# reverse, add 1, and reverse again**

**def plusOne(self, head: ListNode) -> ListNode:**

**# 3:24 --> 3:38 ==> 3:46 1/18/21**

**head\_rev = None**

**while head:**

**head\_rev, head.next, head = head, head\_rev, head.next**

**carry = 1**

**head = head\_rev**

**while head\_rev:**

**total = head\_rev.val + carry**

**head\_rev.val = total % 10**

**carry = total // 10**

**if carry == 0:**

**break**

**# if not head\_rev.next and carry == 1:**

**elif not head\_rev.next:**

**head\_rev.next = ListNode(1)**

**break**

**head\_rev = head\_rev.next**

**head\_rev = None**

**while head:**

**head\_rev, head.next, head = head, head\_rev, head.next**

**return head\_rev**

**# Recursive Approach**

1. **1019. Next Greater Node in Linked List**

**# 1 stack**

**def nextLargerNodes(self, head: ListNode) -> List[int]:**

**# 9:02 1/18/21**

**n = 0**

**tmp = head**

**while tmp:**

**n += 1**

**tmp = tmp.next**

**res = [0] \* n**

**loc = 0**

**sk = []**

**while head:**

**if not sk or sk[-1][1] >= head.val:**

**sk.append([loc, head.val])**

**head = head.next**

**loc += 1**

**else:**

**i, val = sk.pop()**

**res[i] = head.val**

**return res**

**#**

**def nextLargerNodes(self, head: ListNode) -> List[int]:**

**# 9:02 11/20/20**

**res, sk, idx = [], [], 0**

**while head:**

**if not sk or sk[-1][0] >= head.val:**

**sk.append([head.val, idx])**

**res.append(0)**

**head = head.next**

**idx += 1**

**else:**

**val, i = sk.pop()**

**res[i] = head.val**

**return res**

1. **817. Linked List Components**

**#**

**def numComponents(self, head: ListNode, G: List[int]) -> int:**

**# 11:53 --> 12: 07 --> 12: 30 , 11/21/20**

**cnt = 0**

**G = set(G)**

**while head:**

**if head.val not in G:**

**head = head.next**

**else:**

**cnt += 1**

**while head and head.val in G:**

**# G.remove(head.val)**

**head = head.next**

**return cnt**

1. **328. Odd Even Linked List**

**7:06**

**#**

**def oddEvenList(self, head: ListNode) -> ListNode:**

**# 1/20/21**

**e = e\_head = ListNode()**

**o = o\_head = ListNode()**

**cnt = 0**

**while head:**

**if cnt % 2 == 0:**

**e.next = head**

**head = head.next**

**e = e.next**

**e.next = None**

**else:**

**o.next = head**

**head = head.next**

**o = o.next**

**o.next = None**

**cnt += 1**

**e.next = o\_head.next**

**return e\_head.next**

**#**

**def oddEvenList(self, head: ListNode) -> ListNode:**

**# 1/20/21**

**e = e\_head = ListNode()**

**o = o\_head = ListNode()**

**cnt = 0**

**while head:**

**if cnt % 2 == 0:**

**e.next = head**

**head = head.next**

**e = e.next**

**# e.next = None**

**else:**

**o.next = head**

**head = head.next**

**o = o.next**

**# o.next = None**

**if not head:**

**o.next = None**

**cnt += 1**

**e.next = o\_head.next**

**return e\_head.next**

1. **725 Split List in Parts**

**def splitListToParts(self, root: ListNode, k: int) -> List[ListNode]:**

**# 1:12 --> 1:35 --> 11/24/20**

**res = [None] \* k**

**head = root**

**len\_nodes = 0**

**while head:**

**len\_nodes += 1**

**head = head.next**

**avg, ext = divmod(len\_nodes, k)**

**i = 0**

**while i < k and root:**

**res[i] = root**

**n = avg + 1 if i < ext else avg**

**for j in range(1, n):**

**root = root.next**

**tmp = root.next**

**root.next = None**

**root = tmp**

**i += 1**

**return res**

1. **24. Swap Nodes in Pairs**

**def swapPairs(self, head: ListNode) -> ListNode:**

**dummy = dummy\_head = ListNode()**

**dummy.next = head**

**while head and head.next:**

**tmp = head.next.next**

**dummy.next, dummy.next.next = head.next, head**

**dummy = head**

**head = dummy.next = tmp**

**return dummy\_head.next**

1. **148. Sort List**

**def sortList(self, head: ListNode) -> ListNode:**

**# 11/27/20, 8:51**

**def get\_mid(head):**

**# mid\_prev = None**

**# while head and head.next:**

**# mid\_prev = head if not mid\_prev else mid\_prev.next**

**# head = head.next.next**

**# mid = mid\_prev.next**

**# mid\_prev.next = None**

**# return mid**

**mid = head**

**while head and head.next:**

**if mid != head:**

**mid = mid.next**

**head = head.next.next**

**tmp = mid.next**

**mid.next = None**

**return tmp**

**def merge(l1, l2):**

**head = dummy = ListNode()**

**while l1 and l2:**

**if l1.val < l2.val:**

**head.next = l1**

**l1 = l1.next**

**else:**

**head.next = l2**

**l2 = l2.next**

**head = head.next**

**if l1:**

**head.next = l1**

**if l2:**

**head.next = l2**

**return dummy.next**

**def merge1(list1, list2):**

**head = dummy = ListNode()**

**while list1 and list2:**

**if list1.val < list2.val:**

**head.next = list1**

**list1 = list1.next**

**else:**

**head.next = list2**

**list2 = list2.next**

**head = head.next**

**if list1:**

**head.next = list1**

**else:**

**head.next = list2**

**return dummy.next**

**if not head or not head.next:**

**return head**

**mid\_node = get\_mid(head)**

**left = self.sortList(head)**

**right = self.sortList(mid\_node)**

**return merge(left, right)**

1. **147. Insertion Sort List**

**def insertionSortList(self, head: ListNode) -> ListNode:**

**# 6:11, 11/5/20**

**# 11/7/20**

**# 11/28/20**

**# 11/29/20 4:53**

**# 11/30/20, 12:16**

**new\_head = ListNode()**

**cur = new\_head.next = head**

**while cur and cur.next:**

**if cur.val <= cur.next.val:**

**cur = cur.next**

**else:**

**next\_node = cur.next.next**

**cur\_head = new\_head**

**while cur\_head.next.val < cur.next.val:**

**cur\_head = cur\_head.next**

**cur.next.next = cur\_head.next**

**cur\_head.next = cur.next**

**cur.next = next\_node**

**return new\_head.next**

1. **143. Reorder List**

**def reorderList(self, head: ListNode) -> None:**

**"""**

**Do not return anything, modify head in-place instead.**

**"""**

**# 2:48 9/29/20**

**# 1:41 12/2/20**

**# 6:03 -- 1/29/21,**

**if not head or not head.next or not head.next.next:**

**return head**

**# find the middle one**

**pre = slow = fast = head**

**while fast and fast.next:**

**pre = slow**

**slow = slow.next**

**fast = fast.next.next**

**if fast: # odd**

**mid = slow.next**

**slow.next = None**

**else: # even**

**mid = slow**

**pre.next = None**

**# reverse mid**

**tail = None**

**while mid:**

**mid.next, tail, mid = tail, mid, mid.next**

**new\_head = ListNode()**

**while head and tail:**

**new\_head.next = head**

**head = head.next**

**new\_head = new\_head.next**

**new\_head.next, tail, new\_head = tail, tail.next, tail**

**if head: # odd**

**new\_head.next = head**

**return new\_head.next**

**#**

**def reorderList(self, head: ListNode) -> None:**

**"""**

**Do not return anything, modify head in-place instead.**

**"""**

**# 2:48 9/29/20**

**if not head:**

**return head**

**# find mid**

**slow, fast = head, head**

**while fast.next and fast.next.next:**

**slow = slow.next**

**fast = fast.next.next**

**mid = slow.next**

**slow.next = None**

**# reverse mid**

**mid\_rev = None**

**while mid:**

**tmp\_next = mid.next**

**mid.next = mid\_rev**

**mid\_rev = mid**

**mid = tmp\_next**

**# combine**

**while head and mid\_rev:**

**tmp\_next = head.next**

**head.next = mid\_rev**

**mid\_rev = mid\_rev.next**

**head.next.next = tmp\_next**

**head = tmp\_next**