# <https://leetcode.com/problems/two-sum/>

#O(N) Time, O(N) Space

**class** **Solution**(object):

**def** **twoSum**(self, nums, target):

dictionary = {}

**for** key, value **in** enumerate(nums):

complement = target-value

**if** complement **in** dictionary:

**return** [dictionary[complement],key]

**else**:

dictionary[value] = key

We will want to use a HashMap(dictionary) for this solution. We will also want to use the enumerate function to iterate through the values in nums so that we can keep the value of the counter. The solution we are looking for is “x+y=target”. If we want to solve for y, we will rearrange this to “y = target-x”, y being the complement, target being the target number we’re trying to sum up to, and value being the current value for our iteration. During our iteration if we find the complement in our dictionary, we are going to return the index of complement and our current index. Otherwise, we set the index of our value to our current key.

**Traverse array, if complement is in dictionary, return both its index and our current index, if not then set the index of our current value to our current index.**

# <https://leetcode.com/problems/reorder-data-in-log-files/>

#O(NLogN) Time, O(N) Space

**class** **Solution**(object):

**def** **reorderLogFiles**(self, logs):

letter\_list=[]

digit\_list=[]

**for** log **in** logs:

**if** log[-**1**].isdigit():

digit\_list.append(log)

**else**:

letter\_list.append(log)

letter\_list = sorted(letter\_list, key=**lambda** letter: (letter.split()[**1**:],letter.split()[**0**]))

**return** letter\_list+digit\_list

We can have two arrays, one for letters and one for digits. We iterate through each log and check the last index to see if it is a digit or not. If it is, we will add it to the digit array and if it is not, we will add it to the letter array. We will then use a lambda sort function that first checks the suffix and then checks the identifier if there is a tie in suffixes. After the letter array is sorted, we will merge the letter array and digit array (letter array first).

**Check if digit or letter log, sort letter log by suffixes then identifiers, merge lists.**

# <https://leetcode.com/problems/valid-parentheses/>

#O(N) Time, O(N) Space

**class** **Solution**:

**def** **isValid**(self, s: str) -> bool:

stack = []

dict = {"]":"[", "}":"{", ")":"("}

**for** bracket **in** s:

**if** bracket **in** dict.values():

stack.append(bracket)

**elif** bracket **in** dict.keys():

**if** stack == []:

**return** False

**elif** dict[bracket] != stack.pop():

**return** False

**else**:

**return** False

**return** stack == []

We can use a stack and a HashMap for this solution. We iterate through the brackets string and check whether the bracket is an opening or closing bracket. If it is an opening bracket, we push it onto the stack. If it is a closing bracket, we ensure the stack is not empty and then pop the stack to see if this value matches the value of bracket in our dictionary. At the end of the function we should have an empty stack, so we return whether this is true or not.

**Use a stack and a dictionary of bracket values, if opening bracket push onto stack, if closing bracket check for empty string and if the value in dictionary matches this popped stack value, return if stack is empty.**

# <https://leetcode.com/problems/maximum-subarray/>

#O(N) Time, O(1) Space

**class** **Solution**:

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

**for** i **in** range (**1**, len(nums)):

**if** nums[i-**1**] > **0**:

nums[i] += nums[i-**1**]

**return** max(nums)

We can use Kadane’s algorithm for this solution. The question is asking for the maximum contiguous subarray, so we will check for positive subarrays. We iterate through the array starting from the second index and we check if the previous element is positive. If it is, we add it to our current element and continue. Once we are out of the for loop we return the max element, this would be the maximum sum out of all the contiguous subarrays.

**Iterate through the array starting from the second index, if the previous element is positive then add it to our current element, return max element in array.**

# <https://leetcode.com/problems/best-time-to-buy-and-sell-stock/>

#O(N) Time, O(1) Space

**class** **Solution**:

**def** **maxProfit**(self, prices):

max\_profit = **0**

min\_price = float('inf')

**for** price **in** prices:

min\_price = min(min\_price, price)

max\_profit = max(max\_profit, price - min\_price)

**return** max\_profit

We initialize our max\_profit to 0, as this would be the base case. We set our min\_price to infinity so we can override it with any price within our input. We then iterate through our prices and set the minimum price to the lowest number between our current min\_price and the current price in our iteration. We also set the max profit to the highest number between our current max\_profit and the current price in our iteration minus our min\_price. We do this so that we only keep the highest max\_profit, and to check if we are still at the base case of no profit. Return the max\_profit.

**Iterate through prices to find minimum price and subtract it from the current price and see if this value is higher than the current maximum profit, if it is then save this value.**

# <https://leetcode.com/problems/merge-two-sorted-lists/>

#O(N) Time, O(N) Space

**class** **Solution**:

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

dummy = ListNode(0)

prev = dummy

**while** l1 **is** **not** None **and** l2 **is** **not** None:

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

prev.next = l1

l1 = l1.next

**else**:

prev.next = l2

l2 = l2.next

prev = prev.next

prev.next = l1 **if** l1 **is** **not** None **else** l2

**return** dummy.next

We first set a dummy head as a placeholder. We do this because the current node is 0, and the head we will be returning will be a node from one of the two lists and that actual head will be set after this dummy one. Afterwards, we will set the previous node to the dummy so that we can take a step forward in the merged list. We will then iterate through both lists while neither one of them is null and see if the current node value in the first list is less than or equal to the current node value in the second list. If it is, we set the previous value’s next value to the current node in the first list and step forward in list one. If it is not, we set the previous value’s next value to the current node in the second list and step forward in list two. After the previous value’s next value has been set from one the two conditions set previously, we set that value as the previous value to step forward in the merged list. Once we are out of the while loop, it means one of the lists are null. So, we glue the non-null list onto the end of our merged list since it is already sorted. Once we are done, we return all the values after our dummy head.

**Make a dummy head and while neither input lists are null, set the lesser or equal node as the next value in our merged list, once we’ve reached the end of an input list we will attach the other list to the end of our merged list and return everything after the dummy head.**

# <https://leetcode.com/problems/reverse-linked-list/>

#O(N) Time, O(1) Space

**class** **Solution**:

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

pointer\_one = None

pointer\_two = head

**while** pointer\_two != None:

pointer\_three = pointer\_two.next

pointer\_two.next = pointer\_one

pointer\_one = pointer\_two

pointer\_two = pointer\_three

**return** pointer\_one

We can solve this question by iterating through the linked list and setting the next node as the previous node, thus reversing the list. We will do this by utilizing three pointers. We will want these pointers to keep track of the current node, the previous node, and the next node. We will initialize pointer one as None, as initially the head will have no previous node, and the second pointer as the head node. While the current node in our iteration (initially the head) is not none, we will set a third pointer to the next node of the current node. We want to do this because once we override pointer\_two.next and set it to the previous node, we will lose our bridge to get to the next node. The third pointer is just a placeholder. Once we set the third pointer to the next node, we will override the reference to our next node by setting it to the previous node, pointer\_one. We then move both our current node pointer (pointer two) and our previous node pointer (pointer one) forward. We will return pointer one at the end as it will be the new head.

**Traverse the linked list and set the next node to the previous node by using three pointers to keep track of the previous, current, and next nodes.**

# <https://leetcode.com/problems/add-strings/>

#O(N) Time, O(N) Space

**class** **Solution**:

**def** **addStrings**(self, num1: str, num2: str) -> str:

result = ''

carry, index\_one, index\_two = **0**, len(num1) - **1**, len(num2) - **1**

**while** index\_one >= **0** **or** index\_two >= **0**:

current\_sum = carry

**if** index\_one >= **0**:

current\_sum += int(num1[index\_one])

index\_one -=**1**

**if** index\_two >= **0**:

current\_sum += int(num2[index\_two])

index\_two -=**1**

result += str(current\_sum%**10**)

carry = current\_sum // **10**

**if** carry > **0**:

result += str(carry)

**return** result[::-**1**]

We can solve this question by starting from the ones position of each string and adding that number to our sum. Similarly, we will move to the tens, hundreds, and thousands position after. We will mod our current sum by 10 in each iteration so that we know if we need to carry over any values, we can keep track of this. We will find the carry value at the end of each iteration by dividing our current sum by 10 and initializing our current sum to the carry value at the beginning of the next iteration. If there are any carry values left over once we have broken out of our while loop, we will append the value to the end of our string, then return the reversed string since it will be backwards.

**Traverse strings backwards adding the values in each position while still including carry-overs and return reversed string.**

# <https://leetcode.com/problems/move-zeroes/>

#O(N) Time, O(1) Space

**class** **Solution**:

**def** **moveZeroes**(self, nums: List[int]) -> None:

pointer\_one = **0**

**for** pointer\_two **in** range(**0**, len(nums)):

**if** nums[pointer\_two] != **0**:

nums[pointer\_one], nums[pointer\_two] = nums[pointer\_two], nums[pointer\_one]

pointer\_one += **1**

**return** nums

We can solve this problem using two pointers. If the order of the non-zero values did not matter, we could have a left pointer and a right pointer then move them inwards swapping right zeros with left non-zeros. Since the order does matter however, we will use two pointers initialized at zero. If the value at the second pointer is a non-zero value, we will swap it with the value at the first pointer and move both pointers forward. If it is a zero, we will only move the second pointer forward until we find a non-zero again to swap with the zero at the first pointer.

**Traverse the list using two pointers, one lagging on zeros and one finding non-zeros, if the second pointer finds a non-zero then swap the value with the first pointer and move the first pointer forward.**

# <https://leetcode.com/problems/happy-number/>

#O(log N) Time, O(log N) Space

**class** **Solution**:

**def** **isHappy**(self, n: int) -> bool:

seen = set()

square\_sum = **0**

**while** square\_sum != **1**:

square\_sum = **0**

**while** n > **0**:

square\_sum += (n % **10**) \*\* **2**

n = n // **10**

**if** square\_sum **in** seen:

**return** False

**else**:

n = square\_sum

seen.add(n)

**return** True

We can solve this question by using a set to keep track of the square sums. We will initialize the square sum to be 0 as we have no sum to process initially. We will then make two while loops, the outer will run until we have a square sum equal to 1, the inner will run while our n (our initial input or the previous iteration’s square sum) has digits left to process. Before the inner loop, we will set the square sum back to zero so that we are not adding to the previous iteration’s square sum. The inner loop will process each digit of n, square it, add it to the square sum, and remove it from n by utilizing the mod and division operators. Once we have our square sum, we are going to see if it is in the set. If it is, we return false and break out of the loop. If it is not, we will add it to the set and set n equal to it so it can be processed in the next iteration. If we have reached the end of the outer loop it is because we have a square sum that equals 1, so we return true.

**Use a set to keep track of previous square sums we have seen, process new square sums by squaring each digit and adding them all together.**

# <https://leetcode.com/problems/reverse-integer/>

**class** **Solution**:

**def** **reverse**(self, x: int) -> int:

reversed\_int = **0**

is\_negative = x < **0**

x = abs(x)

**while** x != **0**:

reversed\_int \*= **10**

reversed\_int += x%**10**

x //= **10**

**if** reversed\_int > **2**\*\***31**:

**return** **0**

**if** is\_negative == True:

**return** -reversed\_int

**else**:

**return** reversed\_int

We will first check if x is negative so we know whether the final int will need to be negative as well. We will then convert x to positive by taking the absolute value so we can process each digit individually. We will make a while loop for chopping off each digit from x and it will run until there are no more digits to chop. We will start by multiplying the output integer “reversed\_int” by 10 so that we will have a placeholder for the next digit. Then we will add the last digit to our output by modding x by 10. After that, we will chop off the digit by dividing x by 10, ensuring it does not convert to a float by using “//” instead of “/”. If our reversed integer is larger than a 32-bit signed integer (2^31), we return 0. Otherwise, we return our reversed integer, negative if the input was negative.

**Check if input is negative and add each individual digit to output while using multiplication by ten as a digit placeholder, modulus by 10 as a digit parser and division by 10 as a digit remover, also check if 32-bit signed and return negative if negative.**