Course code/Name: CSA08/ Python Programming

DAY 5 PROGRAMS

1. Given a string s consisting of words and spaces, return *the length of the **last** word in the string.*A **word** is a maximal substring consisting of non-space characters only.

Test Case:
Input: s = "Hello World"
Output: 5
Input: s = " fly me to the moon "
Output: 4
Input: s = "luffy is still joyboy"
Output: 6
Input: s = "123"
Output: 3
Input: s = " 45&29 8*6^4"
Output: 5

2. In an organization they decide to give bonus to all the employees on New Year. A 5% bonus on salary is given to the grade A workers and 10% bonus on salary to the grade B workers. Write a program to enter the salary and grade of the employee. If the salary of the employee is less than $10,000 then the employee gets an extra 2% bonus on salary Calculate the bonus that has to be given to the employee and print the salary that the employee will get.

Sample Input & Output:

Enter the grade of the employee: B
Enter the employee salary: 50000
Salary=50000
Bonus=5000.0
Total to be paid:55000.0

Test cases:

1. Enter the grade of the employee: A
   Enter the employee salary: 8000
2. Enter the grade of the employee: C
   Enter the employee salary: 60000
3. Enter the grade of the employee: B
   Enter the employee salary: 0
4. Enter the grade of the employee: 38000
   Enter the employee salary: A
5. Enter the grade of the employee: B
   Enter the employee salary: -8000

3. Given an integer n, return the least number of perfect square numbers that sum to n. A perfect square is an integer that is the square of an integer; in other words, it is the product of some integer with itself. For example, 1, 4, 9, and 16 are perfect squares while 3 and 11 are not.

Test cases:
1.Input: n = 12 output: 3
2. Input: n = 13, Output: 2
3.Input : n= 1, Output: 1

4.Input: n=4, Output: 2
5.Input: n=3, Output: 1

4. Little Robert likes mathematics. Today his teacher has given him two integers and asked him to find out how many integers can divide both the numbers. Would you like to help him in completing his school assignment? For each test case, print "YEAH" if 'prod' is divisible by 'sum', otherwise print "NAH".
HINT:
Test Cases:
1. Enter the numbers: 60 48
Output: NAH
2. 4, 8
3. -10,0
4. 12,34
5.16,17

5. A peak element is an element that is strictly greater than its neighbors.Given a **0-indexed** integer array nums, find a peak element, and return its index. If the array contains multiple peaks, return the index to **any of the peaks**.You may imagine that nums[-1] = nums[n] = -∞. In other words, an element is always considered to be strictly greater than a neighbor that is outside the array.You must write an algorithm that runs in O(log n) time.
Test Case:
1.Input: nums = [1,2,3,1]
Output: 2
2.Input: nums = [1,2,1,3,5,6,4]
Output: 5
3.Input: nums = [5, 10, 20, 15]
Output: 20
4.Input: nums = [1, 3, 2, 4, 1, 0]
Output: 4
5.Input: nums = [1,1,1,3,2,1,2]
Output: 3

6. Implement a triangular array of the binomial coefficients that arises in probability theory, combinatorics, and algebra. Find the sum of elements in the nth row.
Sample Input:
Enter the number of rows: 5
Enter the row number: 4
Sample Output:

```
    1
   1 1
  1 2 1
 1 3 3 1
1 4 6 4 1
```

Sum of elements in 4th row: 8

Test Cases:
1.0, -1
2. 7,5
3. -1,5
4. 9, -5
5. 10, 8

7. Longest Substring with At Least K Repeating Characters
Given a string s and an integer k, return the length of the longest substring of s such that the frequency of each character in this substring is greater than or equal to k.
s consists of only lowercase English letters.
Test cases:
1.Input: s = "aaabb", k = 3
Output: 3
2.Input: s = "ababbc", k = 2
Output: 5
3. s= “ababab”, k=3
4. s=”xyzxyz” k =2
5.s=12345, k=0

8. Given a matrix of size **N * N** containing only 0s and 1s, where 0 represents white and 1 represents black. The task is to minimize the number of swaps to form a valid chessboard. Only 2 rows or 2 columns can be swapped with each other.If it is impossible to form a chessboard, return -1.

Test Case:
1.Input: board = [[0,1,1,0],[0,1,1,0],[1,0,0,1],[1,0,0,1]]
Output: 2
2.Input: board = [[0,1],[1,0]]
Output: 0
3.Input: board = [[1,0],[1,0]]
Output: -1
4.Input: [[0, 1, 0], [1, 0, 1], [1, 1, 0]]
Output: -1
5.Input: [[0, 1, 1, 0], [0, 1, 1, 0], [1, 0, 0, 1], [1, 0, 0, 1]]
Output: 2

9. Write a function shuffle(l1,l2) that takes as input two lists, 11 and l2, and returns a list consisting of the first element in l1, then the first element in l2, then the second element in l2, then the second element in l2, and so on. If the two lists are not of equal length, the remaining elements of the longer list are appended at the end of the shuffled output.

Sample Input:

Enter the number of elements of l1: 3
Enter the element: 1
Enter the element: 3
Enter the element: 5
Enter the number of elements of l2:5
Enter the element: 2
Enter the element: 4
Enter the element: 6
Enter the element: 8
Enter the element: 10

Sample output:

Shuffled list=[1,2,3,4,5,6,8,10]

Test cases:

1. 0,4
2. -1,1
3. 5,5
4. 10,5
5. 6,9

10. Reverse Words in a String

Given an input string s, reverse the order of the words.

A word is defined as a sequence of non-space characters. The words in s will be separated by at least one space.

Return a string of the words in reverse order concatenated by a single space.

Note that s may contain leading or trailing spaces or multiple spaces between two words. The returned string should only have a single space separating the words. Do not include any extra spaces.

Test Cases:

1.Input: s = "the sky is blue"
Output: "blue is sky the"
2.Input: s = " hello world "
Output: "world hello"
3.Input: s = "a good   example"
Output: "example good a"
4. s= “apple is red”
5.s= “Red rose”