BCSE101E - Computer Programming: Python

Practice Problem Set 2 (Module 4 to 6)

(Deadline: 6th January 2023)

School of Computer Science and Engineering

Vellore Institute of Technology

Module 4 (List (2), Tuple(1), Dictionary(1), 1-Set)

1. Create a Python code that takes every object from the list and check if it has list object or not. If a list object is present in a list, it should be unpacked and the overall count of the list should be conveyed. If list object is not present in the existing list, it should say "cannot unpack"

    Test Case 1:

    Sample Input: [[1,2],'a',"Hello"]

    Sample output: 4

    Test Case 2:

    Sample Input: [1,2,3]

    Sample Output: cannot unpack

    Test Case 3: [Hidden]

    Sample Input:[]

    Sample Output: cannot unpack

2. A website requires the users to input username and password to register. Write a program to check the validity of password input by users (using tuples only)

    Following are the criteria for checking the password:

    1. At least 1 letter between [a-z]

    2. At least 1 number between [0-9]

    1. At least 1 letter between [A-Z]

    3. At least 1 character from [$#@]

    4. Minimum length of transaction password: 6

    5. Maximum length of transaction password: 12

    Your program should accept a sequence of comma separated passwords and will check them according to the above criteria. Passwords that match the criteria are to be printed, each separated by

a comma. If none of the password is valid, you should print "invalid" (Hard)

Test Case 1:

Sample Input= ABd1234@1,a F1#,2w3E*,2We3345
Sample Output= ABd1234@1

Test Case 2:

Sample Input= 123, abc, abc@123
Sample Output= abc@123

Test Case 3: (Hidden)
Sample Input= 123, abc, @@@
Sample Output=invalid

3. Write a Python code for the following:

- A list has the objects of maximum 2 strings, 2 complex numbers and 2 integers.

- If atleast one integer object is prime, all strings should be reversed and the real part as well as the imaginary part of all the complex numbers should be interchanged
- if atleast one string object is palindrome, all the complex numbers should be conjugated and the integer objects should be negated.
- If both of the above conditions are satisfied, print the middle element of the list.
- If none of the above conditions satisfied, convert all the strings into list object.

Test Case 1:

Input=[(5+3j),"Madam", 6, -1]

Output=[(5-3j),"Madam",-6,1]

Test Case 2:

Input= ["Hello", "Python", 3, 25, (-1+7j)]

Output= ["olleH", "nohtyP",3,25,(7-1j)]

Test case 3:

Input=["Malayalam",(3+3j),(7-2j),"CSE"7]

Output= (7-2j)

Test Case 4:

Input=["Hello", 12,(3-8j)]

3

Output=["H","e","l","l","o",12, (3-8j)]

Test Case 5:

Input=[111]

Output="Invalid Data"

4. A team has maximum 7 members. They have to fill a form indicating their name and age in the format of name:age. The data collector task is convert all the team members given data to list and give it as input to network admin. The Network admin will perform modifications in the given list based on the following conditions. (Dictionary)

- If anyone shares same age, their names are merged together as single name and their ages should be cube rooted.
- If anyone shares same name, their ages should be merged together and the duplicate names are to be removed.
- If any of the input is in wrong format (say age:name instead of name:age), that should be verified and modified in the correct format (name: age)

  Test case 1:

  Input= [{"ajay":27},{"Sanjay":28},{"Prathap":15}, {"Vikrant":27}]

  Output= [{"ajayVikrant":3}, {"Sanjay":28},{"Prathap":15}]

  Test case 2:

  Input=[{"Ramesh":15},{"Rajesh":17},{"Ramesh":10}]

  Output=[{"Ramesh":1510},{"Rajesh":17}]

  Test case 3:

  Input=[{"sam":29},{88:"Gukesh"}]

  Output=[{"sam":29},{"Gukesh":88}]

5. Calculate the following numbers in numerology using below table. (using Set only)

Pythagoren numerology number								
1	2	3	4	5	6	7	8	9
A	B	C	D	E	F	G	H	I
J	K	L	M	N	O	P	Q	R
S	T	U	V	W	X	Y	Z	

a. Destiny number (sum of the numerical value assigned to each letter in the name up to single digit)

Ex: TEENA (2+5+5+5+1=18=1+8=9)

b. Soul urge number/Heart's desire number (sum of the numerical value assigned to each VOWEL in the name up to single digit)

Ex: TEENA (5+5+1=11=2)

c. Dream number (sum of the numerical value assigned to each CONSONANT in the name up to single digit)

Ex: TEENA (2+5=7)

Input/ Output format

Inputs	**Output**
Enter name	Destiny number
	Soul urge number
	Dream number

Test cases

Case=1 Input= TEENA Output=9 2 7	Case=2 Input= SYAM SUDHA Output=3 5 7	Faculty choice	Faculty choice

Note:

a. Input in small case

b. First name, middle name and last name

Wrong inputs like numbers or special symbols

Module 5 (Strings(2), Regular Expressions(3))

6. An institution mandated all its employees to submit their PAN card through the google form. There are some mischievous employees who purposefully submitting random number as PAN card number instead of PAN card number format. You design a python code to check whether the data entered by the employee is the valid PAN card number or not. If it is a valid PAN card format, print "Valid" otherwise print "Invalid".

The rule for PAN Card number is as follows:

- In total, it should be an alphanumeric string of length 10
- The first half of the PAN is alphabets only
- The last last character should be an alphabet
- The remaining characters are numbers only
- No special Characters are allowed
- Only Upper case characters are allowed

Test case 1:

Input= BIIPR2222K

Output = valid

Test case 2:

Input=Azzrt@345l

Output= Invalid

Test case 3:

Input=biips1234l

Output= Invalid

7. Using the following data, create a program that prints all feasible strings of user-specified length (l), which ranges from 1 to 9.

P1: Pick nine characters from the user and give them a number between one and nine.

P2: Take a lucky number (n) between 1 and 9 from the user.

P3: Also ask the user to enter length (l), which ranges from 1 to 9.

Show all possible string combinations with length l. (i.e., taken from P3). The sum of the values for the created string characters (i.e., from P1) must equal n. (i.e, from P2).

Example:

take n charcters: a b c d e f g h i

assign 9 integers:1 2 3 4 5 6 7 8 9

Ask lucky number: let's say 9

ask string length: 3

then the possible string of length 3 whose sum is 9 are: bcd, abe, acd

because:

bcd

2+3+4=9

abe

1+2+6=9

acd

1+3+5=9

Sample input: a b c d e f g h i 9 3 Sample output: bcd abe acd	Sample input: a b c d e f g h i 7 3 Sample output: abd
Sample input: a b c d e f g h i 8 3 Sample output: abe acd	

8. There is a crime scene (let's say burglary) happened and the forensic people collected a hair sample from that scene. Now it is the task of the forensic person to checkout DNA sequence of the hair sample is matching with the suspected person (say X) or not.

[Hint: The DNA sequences are unique for every individual. That is, one person's DNA sequence should not repeat for another person's DNA. Thus, the uniqueness is identified through the maximum count of repetition of code "AGCT" subsequence (as shown below).

Person 1: GCC**AGCT**AGCTAGCTAGCTAGCTAGCTAGCTTTTGGGAGCTAGCTAGCTG...... (7 AGCT sequences)

Person 2: GCCAGCTAGCTAGCTAGCTTTAGCTAGCTCCGGA……….. (4 AGCT sequences)]

Write a python code that accepts the hair sample DNA sequence as well as Person X DNA sequence. If there is exact match of position and maximum count of AGCT sequence, there is a match; otherwise, it is a mismatch. Also, if the input sequence has anything apart from AGCT and their combinations, it is a clear mismatch irrespective of count and position.

Input	Output
DNA sequence code of hair sample and person X	MATCH/MISMATCH

Testcase 1

Input=
GCCAGCTAGCTAGCTAGCTAGCTAGCTAGCTTTTGGGAGCTAGCTAGCTG

CCCAGCTAGCTAGCTAGCTAGCTAGCTAGCTTTTGGGAGCTAGCTAGCTGA A

Output= MATCH

Testcase 2

Input= GCCAGCTAGCTAGCTAGCTTTAGCTAGCTCCGGAZ

AAAAGCTAGCTAGCTAGCTTTAGCTAGCTCCGGAZ

Output = MISMATCH

Testcase 3

Input=AGCTAGCTAGCT

AGCTAGCTAGCTAGCT

Output=MISMATCH

9. Let's assume you posted a story in social media which goes viral today. However haters tries to troll the content and attacking your comment section! As to neutralize the threat in the comment section, one way of dealing this situation is to remove all of the vowels from the trolls' comments. Design a python code that takes a string argument and returns a new string with all vowels removed.

Case1	Case2	Case3
Input="This conetent goes viral and making issues to the content creator" Output="Ths cntnt gs vrl nd mkng sss t th cntnt crtr"	Input="This Year I wil use Yen as my International Currency" Output="Ths Yr wl s Yn s my ntrntnl Crrncy"	Input="aeiou" Output=""

10. Assume you input a lower case string. Find the length of the longest substring of given string such that the characters in it can be rearranged to form a palindrome.

Case1	Case2	Case3
Input=murali Output=1	Input= malayalam Output=9	Input= adbabd@# Output=Invaid Input

Module 6 (Functions(3), Files (1), Files and Functions(1))

11. There is a hostel room allocation policy followed in the institution based on marks. Initially, a student can choose any room from room numbers 1 to 1000. If the overall mark in a semester is less than 50%, he will be allotted any room between [1 and 400 + percentage value], such that it should be any perfect number in that range. If there is no perfect number available in that range, he cannot avail any room. In case, the overall mark in a semester is more than 50%, he will be allotted a room between [500 + percentage value and 1000] such that it should be any Ramanujan number. If there is no Ramanujan number available in that range, he can avail a room number which is any perfect square number in that range. Write a python function to implement the above scenario.

Input	Output
Mark Percentage	Room number allotted status

Test case 1:

Input = 37

Output = 496

Test case 2:

Input = 60

Output= 728

Test case 3:

Input = 100

Output=737

12. There are "n" candidates participating in the online quiz competition. The questions, answer key and mark allocation are given below:

Q.No:	1	2	3	4	5
Ans:	A	B	B	A	C

Each question carries 2 marks. For every wrong answer, 25 % of a mark should be reduced. There is no mark deduction for every unanswered question.

Candidates should choose the option either "A" or "B" or "C" or "D" for answering a question. If a candidate wishes to not answer for a question, he/she should choose the option X.

Write a python function such that accepts number of candidates and the answer options of the individuals in the ascending order of questions and compute the rank of participating candidates based on the total marks.

Input	Output
Number of candidates Answer options	Rank list with marks

Test case 1:

Input= 5

A C A X B

A B C D X

X X X X C

A A A A A

B X X B A

Output

Rank   Candidates   Total

1   C2,C4   3.75

2   C3   2.00

3   C1   0.25

4   C5   -0.75

Test case 2

Input =3

A D D D D

11

C C C C C

X X X X X

Output=

Rank Candidates Total

1   C1   1.00

2   C3   0.00

3   C2   -1.25

Test case 3

Input=1

A X X X A

Output

Rank Candidates Total

1   C1   4.00

(Note here C1, C2, C3, …. Denotes Candidate 1, candidate 2, candidate 3….)

13. Suppose you're working as data analyst in a healthcare department where you need to analyze the patient's data. Assume you'd received a dataset comprises diabetic details. Design a python program to read diabetes.csv and print total number of lines present in the file. Also find out the how many null values exist in the file. Finally print all the information in a new output file.

Note:

First download the sample dataset from the given link

https://www.kaggle.com/datasets/uciml/pima-indians-diabetes-database

Import csv as a package

14. There are "n" customers who buy 'm" products in an online mart. Write a python code which accepts customerId, Product, Quantity, rate from console. The program should execute the following transactions using functions:

1. Fn1(): Given a customerID, display the total amount paid by the customer

2. Fn2() : Find and display the product which has maximum and minimum orders placed.

3. Fn3(): Find the customer who has maximum order placed.

Prepare a final bill according to the given format as given below and write it to a file.

Sample I/0:

Sample Input	Output (Written on to a file)
No. of Customers: n	customerId,Product,Quantity,rate,TotalPrice
No. of products: m	111,Soap,1,45.00,45.00
customerID	111,Book,2,100.00,200.00
Product	222,Pen,1,20.00,20.00
Quantity	333,Inkbottle,1,50.00,50.00
Rate	
	TotalAmount: Rs:315

15. Implement a bus reservation system for the route Bangalore to Chennai using files and functions. Read the credentials (user name and password) from the file ("credentials.txt") and match it for further processing. If the credentials are not matching, then print "Invalid Credentials" and terminate the program.

There are 15 seats available in the bus with following tariff. Reservation will be performed in first come first serve basis. Calculate the fare using function. Print the passenger details, departure, arrival station, seat no, booking dates and total fare. (Use Booking Date as 15-11-2022). Save the details in the file ("reservation.txt")

Main Menu
----

1. Booking
2. Cancellation
3. Exit

Booking Menu

A. Regular (12 seats)
B. Tatkal (3 seats)

Fare details from Bangalore

Regular:
Hosur Rs75
Vaniyambadi Rs 250
Vellore Rs 500
Walaja Rs600
Chennai Rs750
*for senior citizen 10% concession (Age 60 and above)

Tatkal Booking fare - Rs100 addition to the regular fare

Cancellation Refund Details
----
20 days before the date of journey - full refund
2 weeks before the date of journey - 90% fare refund
1 week before the date of journey - 80% fare refund
4 days before the date of journey - 50% fare refund
<4 days   - No refund

Input Format

Username
Password
Main Menu Choice
If option choosen as 1

Booking Menu Choice
No. of passengers
Passenger-1 details (Name, Age)
Passenger-2 details (Name, Age)
.
.
Passenger-N details (Name, Age)
Travel Destination
Date of Journey

Main Menu Choice
if option choosen as 2

Passenger Name and Age
Date of Cancellation

Output Format

Remaining Seats:
Regular =
Tatkal =
Journey Details:
Passenger Name - Age - Source - Destination - Seat No
Date of Journey:
Total Fare =

Sample Input	Output (Written on to a file)
abc 123 1 A 3 Arun, 39 sheethal, 34 karthik, 70 Chennai 25-11-2022 1 B 3 Akash, 53 Rhea, 15 Sam, 26 Vellore 17-11-2022 3	Remaining Seats: Regular = 9 Tatkal = 3 Passessnger Name - Age - Source - Destination - Seat No Arun - 39 - Bengaluru - Chennai - 15 sheethal - 34 - Bengaluru - Chennai - 14 karthik - 70 - Bengaluru - Chennai, 13 Date of Journey: 25-11-2022 total fare = Rs. 2175 Remaining Seats: Regular = 9 Tatkal = 0 Passessnger Name - Age - Source - Destination - Seat No Akash - 53 - Bengaluru - Vellore - 12 Rhea - 15 - Bengaluru - Vellore - 11 Sam - 26 - Bengaluru - Vellore - 10 Date of Journey: 17-11-2022 total fare = Rs. 1800

Test case 1
----
input
----
abc
123
1
A
3
Arun, 39

sheethal, 34
karthik, 70
Chennai
25-11-2022
1
B
3
Akash, 53
Rhea, 15
Sam, 26
Vellore
17-11-2022
1
B
2
Bhoomi, 25
Saransh, 60
Walaja
16-11-2022
3

output

Remaining Seats:
Regular = 9
Tatkal = 3
Passessnger Name - Age - Source - Destination - Seat No
Arun - 39 - Bengaluru - Chennai - 15
sheethal - 34 - Bengaluru - Chennai - 14
karthik - 70 - Bengaluru - Chennai, 13
Date of Journey: 25-11-2022
total fare = Rs. 2175

Remaining Seats:
Regular = 9
Tatkal = 0
Passessnger Name - Age - Source - Destination - Seat No
Akash - 53 - Bengaluru - Vellore - 12
Rhea - 15 - Bengaluru - Vellore - 11
Sam - 26 - Bengaluru - Vellore - 10
Date of Journey: 17-11-2022
total fare = Rs. 1800

insuffient seats!!! Try for other dates...

Test case 2
----

input
----
abc
123
1
A
3
Arun, 39
sheethal, 34
karthik, 70
Chennai
25-11-2022
1
B
3
Akash, 53
karthik, 15
Sam, 26
Vellore
20-11-2022
2
karthik
15
15-11-2022
3

output

Remaining Seats:
Regular = 9
Tatkal = 3
Passessnger Name - Age - Source - Destination - Seat No
Arun - 39 - Bengaluru - Chennai - 15
sheethal - 34 - Bengaluru - Chennai - 14
karthik - 70 - Bengaluru - Chennai, 13
Date of Journey: 25-11-2022
total fare = Rs. 2175

Remaining Seats:
Regular = 9
Tatkal = 0
Passessnger Name - Age - Source - Destination - Seat No
Akash - 53 - Bengaluru - Vellore - 12
karthik - 15 - Bengaluru - Vellore - 11
Sam - 26 - Bengaluru - Vellore - 10
Date of Journey: 20-11-2022
total fare = Rs. 1800

Remaining Seats:

Regular = 9
Tatkal = 1
No. of Passessngers to Cancel = 1
Cancelled Passessnger Name = karthik
Cancelled Passessnger Age = 15
Refund Amount = Rs. 300
Cancellation Charge = Rs. 300

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