**100+ Python challenging programming exercises**

**Level description**

**Level 1:** Beginner means someone who has just gone through an introductory Python course. He can solve some problems with 1 or 2 Python classes or functions. Normally, the answers could directly be found in the textbooks.

**Level 2:** Intermediate means someone who has just learned Python, but already has a relatively strong programming background from before. He should be able to solve problems which may involve 3 or 3 Python classes or functions. The answers cannot be directly be found in the textbooks.

**Level 3:** Advanced. He should use Python to solve more complex problem using more rich libraries functions and data structures and algorithms. He is supposed to solve the problem using several Python standard packages and advanced techniques.

**Level 1**

**01**. Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5,

between 2000 and 3200 (both included).

The numbers obtained should be printed in a comma-separated sequence on a single line.

**Hints**: Consider use range method.

**02**. Write a program which can compute the factorial of a given number.

Suppose the following input is supplied to the program:

8

Then, the output should be:

40320

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**03**. With a given integer number n, write a program to generate a dictionary that contains (i : i\*i) such that is an integer number between 1 and n (both included) and then the program should print the dictionary.

Suppose the following input is supplied to the program:

8

Then, the output should be:

{1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64}

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input. Consider use dict().

**04**. Write a program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple which contains every number.

Suppose the following input is supplied to the program:

34,67,55,33,12,98

Then, the output should be:

['34', '67', '55', '33', '12', '98']

('34', '67', '55', '33', '12', '98')

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

tuple() method can convert list to tuple.

**05**. Write a method which can calculate square value of number.

**Hints**: Using the \*\* operator

**06**. Define a class which has at least two methods:

getString: to get a string from console input

printString: to print the string in upper case.

Also please include simple test function to test the class methods.

**Hints**: Use \_\_init\_\_ method to construct some parameters.

**07**. Python has many built-in functions, and if you do not know how to use it, you can read document online or find some books. But Python has a built-in document function for every built-in functions.

Please write a program to print some Python built-in functions documents, such as abs(), int(), input() and add document for your own function.

**Hints**: The built-in document method is \_\_doc\_\_

**08**. Define a class, which have a class parameter and have a same instance parameter.

**Hints**: Define a instance parameter, need add it in \_\_init\_\_ method. You can init a object with construct parameter or set the value later.

**Level 2**

**09**. Write a program that calculates and prints the value according to the given formula:

Q = Square root of [(2 \* C \* D)/H]

Following are the fixed values of C and H:

C is 50. H is 30. D is the variable whose values should be input to your program in a comma-separated sequence.

**Hints**:

If the output received is in decimal form, it should be rounded off to its nearest value (for example, if the output received is 26.0, it should be printed as 26). In case of input data being supplied to the question, it should be assumed to be a console input.

**10**. Write a program which takes 2 digits, X,Y as input and generates a 2-dimensional array. The element value in the i-th row and j-th column of the array should be i\*j.

Suppose the following inputs are given to the program:

3,5

Then, the output of the program should be:

[[0, 0, 0, 0, 0], [0, 1, 2, 3, 4], [0, 2, 4, 6, 8]]

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input in a comma-separated form.

**11**. Write a program that accepts a sequence of words as input and prints the words in a comma-separated sequence after sorting them alphabetically.

Suppose the following input is supplied to the program:

without,hello,bag,world

Then, the output should be:

bag,hello,without,world

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**12**. Write a program that accepts sequence of lines as input and prints the lines after making all characters in the sentence capitalized.

Suppose the following input is supplied to the program:

Hello world

Practice makes perfect

Then, the output should be:

HELLO WORLD

PRACTICE MAKES PERFECT

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**13**. Write a program that accepts a sequence of whitespace separated words as input and prints the words after removing all duplicate words and sorting them alphanumerically.

Suppose the following input is supplied to the program:

hello world and practice makes perfect and hello world again

Then, the output should be:

again and hello makes perfect practice world

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

We use set container to remove duplicated data automatically and then use sorted() to sort the data.

**14**. Write a program which accepts a sequence of comma separated 4 digit binary numbers as its input and then check whether they are divisible by 5 or not. The numbers that are divisible by 5 are to be printed in a comma separated sequence.

Example:

0100,0011,1010,1001

Then the output should be:

1010

Notes: Assume the data is input by console.

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**15**. Write a program, which will find all such numbers between 1000 and 3000 (both included) such that each digit of the number is an even number.

The numbers obtained should be printed in a comma-separated sequence on a single line.

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**16**. Write a program that accepts a sentence and calculate the number of letters and digits.

Suppose the following input is supplied to the program:

hello world! 123

Then, the output should be:

LETTERS 10

DIGITS 3

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**17**. Write a program that accepts a sentence and calculate the number of upper case letters and lower case letters.

Suppose the following input is supplied to the program:

Hello world!

Then, the output should be:

UPPER CASE 1

LOWER CASE 9

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**18**. Write a program that computes the value of a + aa + aaa + aaaa with a given digit as the value of a.

Suppose the following input is supplied to the program:

9

Then, the output should be:

11106

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**19**. Use a list comprehension to square each odd number in a list. The list is input by a sequence of comma-separated numbers.

Suppose the following input is supplied to the program:

1,2,3,4,5,6,7,8,9

Then, the output should be:

1,9,25,49,81

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**20**. Write a program that computes the net amount of a bank account based a transaction log from console input. The transaction log format is shown as following:

D 100

W 200

D means deposit while W means withdrawal.

Suppose the following input is supplied to the program:

D 300

D 300

W 200

D 100

Then, the output should be:

500

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**21**. A website requires the users to input username and password to register. Write a program to check the validity of password input by users.

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.

If the following passwords are given as input to the program:

ABd1234@1, aF1#, 2w3E\*, 2We3345

Then, the output of the program should be:

ABd1234@1

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

**22**. You are required to write a program to sort the (name, age, height) tuples by ascending order where name is string, age and height are numbers. The tuples are input by console. The sorting criteria is:

1: Sort based on name;

2: Then sort based on age;

3: Then sort by score.

The priority is that name > age > score.

If the following tuples are given as input to the program:

Tom,19,80

John,20,90

Jony,17,91

Jony,17,93

Json,21,85

Then, the output of the program should be:

[('John', '20', '90'), ('Jony', '17', '91'), ('Jony', '17', '93'), ('Json', '21', '85'), ('Tom', '19', '80')]

**Hints**: In case of input data being supplied to the question, it should be assumed to be a console input.

We use itemgetter to enable multiple sort keys.