

2020 - ESS 112 Programming in Python

Practice sheet 1

December 2020

This practice sheet is intended for you to get a hands on experience with problem-solving using the concepts learnt in python so far. It is NOT a strict deliverable assignment, but if you want to submit the solutions to this practice sheet, the instructions to submit are given below:

- Answer **all** the multiple choice questions in a separate file, name it “mcq.txt”, and write all the answers sequentially
eg. “**1. a**” if option ‘a’ is correct for question 1
 - For every programming question, write your program in a separate file and name it *question_num.py*. For question 2, name it “**2.py**”.
 - Make a submission folder and put mcq.txt and all the python files inside it.
 - Name your submission folder as RollNumber_a(*assignment number*).
For example, IMT2020001_ps1.
 - Compress your submission folder as a zip file and submit it on the LMS submission link.
 - For questions that ask you to take an input, you will have to take an input from the user (terminal) and not write the input yourself.
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Multiple Choice Questions:

1. Is Python case sensitive when dealing with identifiers?
 - (a) Yes
 - (b) No
 - (c) Machine dependent
 - (d) None of the above
2. Which one of these is the floor division operator?
 - (a) /
 - (b) //
 - (c) %
 - (d) None of the above
3. Which of the following is invalid?
 - (a) `abc = 1,000,000`
 - (b) `a b c = 1000 2000 3000`
 - (c) `a, b, c = 1000, 2000, 3000`
 - (d) `a.b.c = 1,000,000`

4. Which of the following is invalid?

- (a) `_a = 1`
- (b) `__a = 1`
- (c) `_str_ = 1`
- (d) None of the above

5. What is the order of precedence in python?

- i) Parentheses
 - ii) Exponential
 - iii) Multiplication
 - iv) Division
 - v) Addition
 - vi) Subtraction
- (a) i, ii, iii, iv, v, vi
 - (b) ii, i, iii, iv, v, vi
 - (c) ii, i, iv, iii, v, vi
 - (d) i, ii, iii, iv, vi, v

6. What will be the output of the following Python code?

```
x = ['ab', 'cd']
for i in x:
    i.upper()
print(x)
```

- (a) ['ab', 'cd']
- (b) ['AB', 'CD']
- (c) [None, None]
- (d) None of the above

7. What will be the output of the following Python code?

```
i = 5
while True:
    if i % 0011 == 0:
        break
    print(i)
    i += 1
```

- (a) 5 6 7 8 9 10
- (b) 5 6 7 8
- (c) 5 6
- (d) Error

8. What will be the output of the following Python code?

```
True = False
while True:
    print(True)
    break
```

- (a) True
- (b) False

- (c) None
 - (d) None of the above
9. What is the output when we execute `list("hello")`?
- (a) ['h', 'e', 'l', 'l', 'o']
 - (b) ['hello']
 - (c) ['llo']
 - (d) Error
10. Given `list1 = [4, 2, 2, 4, 5, 2, 1, 0]`, which of the following is the correct syntax for the slicing operation?
- (a) `print(list1[0])`
 - (b) `print(list1[:2])`
 - (c) `print(list1[:-2])`
 - (d) All of the above
11. What will be the output of the following Python statement?
- ```
>>> "a" + "bc"
```
- (a) a
  - (b) bc
  - (c) abc
  - (d) Error
12. What will be the output of the following Python code?
- ```
print(r"\nhello")
```
- (a) A new line and hello
 - (b) \nhello
 - (c) The letter r and then hello
 - (d) Error
13. Given `t = (1, 2, 4, 3)`, which of the following is incorrect?
- (a) `print(t[3])`
 - (b) `t[3] = 45`
 - (c) `print(max(t))`
 - (d) `print(len(t))`
14. What will be the output of the following Python code?
- ```
>>> t = (1, 2, 4, 3, 8, 9)
>>> [t[i] for i in range(0, len(t), 2)]
```
- (a) [2, 3, 9]
  - (b) [1, 2, 4, 3, 8, 9]
  - (c) [1, 4, 8]
  - (d) (1, 4, 8)
15. Which of the following statements will create a dictionary?
- (a) `d = {}`
  - (b) `d = {"john": 40, "peter": 45}`

- (c) `d = {40: "john", 45: "peter"}`  
 (d) All of the above
16. Given `d = {"john": 40, "peter": 45}`, what command do we use to delete the entry for "john"?
- (a) `d.delete("john": 40)`  
 (b) `d.delete("john")`  
 (c) `del d["john"]`  
 (d) `del d("john": 40)`

### Programming Questions:

- Write a program to take an integer list as an input and print the second largest element in the list.  
*Sample Input/Output:*  
**Input:**  
 1, 20, 10, 20  
**Output:**  
 10
- Write a program to compute the *compound interest* annually, given the *principal*, *time* and *rate of interest*.  
*Sample Input/Output:*  
**Input:**  
 1200  
 2  
 5.4  
**Output:**  
 1333.009243
- Given two integer lists as an input, write a program to print the maximum and minimum values among all the elements in both lists.  
*Sample Input/Output:*  
**Input:**  
 1, 3, 4, 5, 2, 6  
 3, 4, 8, 3, 10, 1  
**Output:**  
 10 1  
**Explanation:**  
 The maximum element is 10 from the second list and the minimum is 1 from the first/second list
- Write a program to compute the transpose of a matrix. The first two input values are the number of rows and columns and the next list of input values represent the elements of the matrix.  
*Sample Input/Output:*  
**Input:**  
 3  
 2  
 1, 2, 3, 4, 5, 6  
**Output:**  
 [[1, 3, 5], [2, 4, 6]]

**Explanation:**

The input matrix in list form is:

$$M = \begin{bmatrix} 1, 2, \\ 3, 4, \\ 5, 6 \end{bmatrix}$$

thus the transpose will be:

$$M^T = \begin{bmatrix} 1, 3, 5, \\ 2, 4, 6 \end{bmatrix}$$

5. Write a program to calculate the factorial of a number using both **for** loop and **while** loop.

*Sample Input/Output:*

**Input:**

5

**Output:**

120

6. Given a list of numbers, calculate the average value of their squares using loops.

*Sample Input/Output:*

**Input:**

1, 2, 3, 4, 5

**Output:**

11

**Explanation:**

$$\text{sum}/5 = (1^2 + 2^2 + 3^2 + 4^2 + 5^2)/5 = 55/5 = 11$$

7. Write a program to check if a given input string is a palindrome. Print YES or NO accordingly. A string is a palindrome if reversing it gives the same string.

*Sample Input/Output:*

**Input:**

racecar

**Output:**

YES

8. Print the number of values in the range  $[x, y]$  such that it is a multiple of  $z$ .  $x$ ,  $y$  and  $z$  are given as inputs by the user.

*Sample Input/Output:*

**Input:**

3

10

5

**Output:**

2

**Explanation:**

The numbers in the range  $[3, 10]$  are 3, 4, 5, 6, 7, 8, 9, 10. 5 and 10 are divisible by 5. Therefore, the answer is 2.

9. Make a grocery list using python dictionaries. It should keep track of item name, price (per kg) and quantity (in kg). The grocery list contains the following items.

| Item     | Price (in Rs) |
|----------|---------------|
| Tomato   | 25.49         |
| Potato   | 30.25         |
| Carrot   | 70            |
| Cucumber | 30.29         |
| Apple    | 100.10        |
| Orange   | 40            |
| Banana   | 65            |

Initialize the data structure with item name and price as given in the above table and quantity as 0. The goal is to update the quantity of the appropriate item as the user adds items to his/her cart and compute the total bill amount.

*Sample Input/Output:*

**Input:**

Tomato 2

Apple 1.5

Tomato 1

**Output:**

Rs. 226.62

**Explanation:**

Total amount =  $(3 * 25.49) + (1.5 * 100.10) = 76.47 + 150.15 = 226.62$

10. Write a program to do the following. Take a set of strings as an input and store them in a tuple. Print a tuple whose elements are the elements of the input tuple with 'not' prefixed to them.

*Sample Input/Output:*

**Input:**

apple orange banana

**Output:**

('not apple', 'not orange', 'not banana')

11. Given a list of integers as an input, print a list containing the double of all the even numbers in the list and the sum of the elements of this new list. You may compute the sum using the `sum()` library function (you do not need `import math` to use it).

*Sample Input/Output:*

**Input:**

4, 5, 3, 2, 6, 4, 1

**Output:**

[8, 4, 12, 8]

32

12. Given a list of integers as an input, copy it into another list, square the first element of the new list and print both lists such that the original list is not modified.

*Sample Input/Output:*

**Input:**

2, 5, 7

**Output:**

[2, 5, 7]

[4, 5, 7]

13. Given a list of numbers, print a list containing the square roots of all the perfect squares using the `math.sqrt()` function (include `import math` to use the function). Print "No Perfect Squares!" if the list does not contain any perfect squares.

*Sample Input/Output:*

**Input 1:**

15, 36, 676, 27, 2

**Output 1:**

[6, 26]

**Input 2:**

15, 27, 2

**Output 2:**

No Perfect Squares!

14. Create a 'playlist' dictionary that maps your favourite artists to their songs. Store the details of each song in a tuple, where the details may include song name, album, year of release and so on. Print the list of songs by each artist and its corresponding year of release in *reverse alphabetical order* of artist name. *Note:* Try to unpack the elements of the tuples in a single line instead of using one line for each element.

**Example:** (this is not a user input)

```
playlist =
{
 "Ed Sheeran":
 [
 ("Thinking Out Loud", "Multiply", 2014),
 ("Sing", "Multiply", 2014),
 ("Perfect", "Divide", 2017)
]
 "Bruno Mars":
 [
 ("Grenade", "Doo-Wops & Hooligans", 2010),
 ("That's What I Like", "24K Magic", 2016),
 ("24K Magic", "24K Magic", 2016)
]
 "Queen":
 [
 ("Bohemian Rhapsody", "A Night At The Opera", 1975),
 ("Killer Queen", "Sheer Heart Attack", 1974),
 ("Don't Stop Me Now", "Jazz", 1978)
]
}
```

**Output:**

Queen:

Bohemian Rhapsody, 1975

Killer Queen, 1974

Don't Stop Me Now, 1978

Ed Sheeran:

Thinking Out Loud, 2014

Sing, 2014

Perfect, 2017

Bruno Mars:

Grenade, 2010

That's What I Like, 2016

24K Magic, 2016