



Masters in Applied Statistics and Data Science (MASDS)
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ASSIGNMENT 03

Course Name: Introduction to Data Science with Python,

Course Code: MASDS04

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1. Write a Python program to count the number of characters (character frequency) in a string. Sample String : google.com Expected Result : {'o': 3, 'g': 2, '.': 1, 'e': 1, 'l': 1, 'm': 1, 'c': 1}

Solution:

```
string = "google.com"
freq = {}

for char in string:
    if char in freq:
        freq[char] += 1
    else:
        freq[char] = 1

print(freq)
```

2. Write a Python program to check if a given key already exists in a dictionary.

Solution:

```
my_dict = {'name': 'John', 'age': 25, 'city': 'New York'}
key = 'age'

if key in my_dict:
    print(f"{key} exists in the dictionary with value: {my_dict[key]}")
else:
    print(f"{key} does not exist in the dictionary")
```

3. Write a Python program that accepts a sequence of comma-separated numbers from the user and generates a list and a tuple of those numbers. Sample data : 1, 5, 7, 23 Expected Output : List : ['1', '5', '7', '23'] Tuple : ('1', '5', '7', '23')

Solution:

```
numbers = input("Enter comma-separated numbers: ")
numbers_list = numbers.split(",")
numbers_tuple = tuple(numbers_list)

print(f"List: {numbers_list}")
print(f"Tuple: {numbers_tuple}")
```

4. Write a Python program to calculate the number of days between two dates. Sample dates : (2014, 7, 2), (2014, 7, 11) Expected output : 9 days

Solution:

```
from datetime import date

date1 = date(2014, 7, 2)
date2 = date(2014, 7, 11)

delta = date2 - date1

print(f"Number of days between {date1} and {date2}: {delta.days} days")
```

5. Write a Python program to solve $(x + y) * (x + y)$. Test Data : $x = 4, y = 3$ Expected Output : $(4 + 3)^2 = 49$.

Solution:

```
x, y = 4, 3
result = x * x + 2 * x * y + y * y
print("({} + {}) ^ 2 = {}".format(x, y, result))
```

6. Write a Python program to compute the future value of a specified principal amount, rate of interest, and number of years. Test Data : amt = 10000, int = 3.5, years = 7 Expected Output : 12722

Solution:

```
amt = 10000
int = 3.5
years = 7
future_value = amt*((1+(0.01*int)) ** years)
print(round(future_value,2))
```

7. Write a Python program that removes duplicate elements from a given array of numbers so that each element appears only once and returns the new length of the array. Sample Input: [0,0,1,1,2,2,3,3,4,4,4] Sample Output: The list of unique numbers: [0,1,2,3,4] length of the unique list : 5

Solution:

```
my_list = [1, 2, 3, 1, 2, 4, 5, 4 ,6, 2]
print("List Before ",
my_list)temp_list = []

for i in my_list:
    if i not in temp_list:
        temp_list.append(i
        )

my_list = temp_list

print("List After removing duplicates ",
my_list)print("Length of the List:",
len(my_list))
```

8. Write a Python program to sort (ascending and descending) a dictionary by key value.

Solution:

```
import operator
d = {1: 2, 3: 4, 4: 3, 2: 1, 0: 0}
print('Original dictionary : ',d)
sorted_d = sorted(d.items(), key=operator.itemgetter(1))
print('Dictionary in ascending order by value :
',sorted_d)sorted_d = dict( sorted(d.items(),
key=operator.itemgetter(1),reverse=True))
print('Dictionary in descending order by value : ',sorted_d)
```

9. Write a Python program to add key to a dictionary. Go to the editor Sample Dictionary : {0: 10, 1: 20} Expected Result : {0: 10, 1: 20, 2: 30}

Solution:

```
d = {0:10, 1:20}
print(d)
d.update({2:30})
print(d)
```

10. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels. Sample Python dictionary data and list labels:
exam_data = {'name': ['Arif', 'Asir', 'Arik', 'Anis', 'Anil', 'Ashish', 'Anahi', 'Alia', 'Alvin', 'Asim'], 'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], 'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], 'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']} labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

Solution:

```
import pandas as pd
import numpy as np

exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'],
             'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],
             'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],
             'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']}
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

df = pd.DataFrame(exam_data, index=labels)
print(df)
```