LISTS

1. List of Squares Create a list of squares of numbers from 1 to 20.

```
x = [(i + 1) * (i + 1) for i in range(20)]
print(x)
```

2. Second Largest Number Find the second largest number in a list without using sort() .

```
x = [9, 4, 6, 78, 56, 129, 897]

for i in range(2):
    largest = x[0]
    for j in x:
        if j > largest:
            largest = j

    if i == 0:
        x.remove(largest)

print(largest)
```

3. Remove Duplicates Write a program to remove all duplicate values from a list while preserving order.

```
x = [1, 2, 3, 4 ,3, 2, 1]
unique = []

for i in x:
    if i not in unique:
        unique.append(i)
print(unique)
```

4. Rotate List Rotate a list to the right by k steps. Example: [1, 2, 3, 4, 5] rotated by 2 → [4, 5, 1, 2, 3]

```
steps = 2

x = [1, 2, 3, 4, 5]

steps = steps % len(x)
print(x[-steps:] + x[:-steps])
```

5. List Compression From a list of numbers, create a new list with only the even numbers doubled.

```
x = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
y = [i*2 for i in x if i%2 == 0]
print(y)
```

TUPLES

6. Swap Values Write a function that accepts two tuples and swaps their contents.

```
def swapper(x: tuple, y:tuple) -> tuple:
    x, y = y, x
    return x, y

a = (1, 2, 3)
b = (4, 5 ,6)

print(swapper(a, b))
```

7. Unpack Tuples Unpack a tuple with student details: (name, age, branch, grade)

and print them in a sentence.

```
x = ("Tharun", 21, "AI&DS", "O+")

print(f"Name: {x[0]}, Age: {x[1]}, Branch: {x[2]}, Grade: {x[3]}.")
```

8. Tuple to Dictionary Convert a tuple of key-value pairs into a dictionary.

Example: (("a", 1), ("b", 2)) → {"a": 1, "b": 2}

```
x = (("a", 1), ("b", 2))
y = {}

for i, j in x:
    y[i] = j

print(y)
```

SETS

9. Common Items Find the common elements in two user-defined lists using sets.

```
x = [1, 2, 3, 4]
y = [3, 4, 5, 6]

x, y = set(x), set(y)

print(x.intersection(y))
```

10. Unique Words in Sentence Take a sentence from the user and print all unique words.

```
sentence = """Python is very fun to learn. Beacause it is Python"""
x = set(sentence.split(" "))
print(x)
```

11. Symmetric Difference Given two sets of integers, print elements that are in one set or the other, but not both.

```
x = {1, 2, 3, 4}
y = {1, 5, 6}

print(x.symmetric_difference(y))
```

12. Subset Checker Check if one set is a subset of another.

```
x = {1, 2, 3, 4}
y = {1, 2, 3}

print(y.issubset(x))
```

DICTIONARIES

13. Frequency Counter Count the frequency of each character in a string using a dictionary.

```
sentence = """Python is very fun to learn. Beacause it is Python"""
freq = {}

for i in sentence:
    if i not in freq:
        freq[i] = 1
    else:
        freq[i] += 1

print(freq)
```

14. Student Grade Book Ask for names and marks of 3 students. Then ask for a name and display their grade (>=90: A , >=75: B , else C).

```
def grader(x):
    if x >= 90:
        return "A"
    elif x >= 75:
        return "B"
    else:
        return "C"

students = {}

for i in range(3):
    name = input("Enter your name: ")
    mark = int(input("Enter your mark: "))
    grade = grader(mark)
    students[name] = [mark, grade]

print("_____")

for i in  range(3):
    name = input("Enter your name to get grade: ")
    print(f"Name: {name}, Grade: {students[name][1]}")
```

15. Merge Two Dictionaries Merge two dictionaries. If the same key exists, sum the values.

```
x = {"a": 1, "b": 2}
y = {"a": 3, "c": 9}

for i, j in y.items():
    if i in x:
        x[i] += j
    else:
        x[i] = j

print(x)
```

16. Inverted Dictionary Invert a dictionary's keys and values. Input: {"a": 1, "b": 2} → Output: {1: "a", 2: "b"}

```
x = {"a": 1, "b": 2}
y = {}

for i,j in x.items():
    y[j] = i

print(y)
```

17. Group Words by Length Input a list of words. Create a dictionary where the key

is word length and the value is a list of words of that length.

```
words = ['Bleach', 'follows', 'Ichigo', 'Kurosaki,', 'a',
'teenager', 'who', 'can', 'see', 'ghosts,', 'as', 'he', 'becomes',
'a', 'Soul', 'Reaper', 'after', 'a', 'Soul', 'Reaper,', 'Rukia',
'Kuchiki,', 'transfers', 'her', 'powers', 'to', 'him', 'to',
'fight', 'Hollows.', 'Ichigo,', 'along', 'with', 'Rukia', 'and',
'other', 'friends,', 'is', 'tasked', 'with', 'defending', 'humans',
'from', 'Hollows,', 'guiding', 'souls', 'to', 'the', 'afterlife,',
'and', 'maintaining', 'the', 'balance', 'between', 'the', 'living',
'and', 'the', 'dead.']
grouper = {}

for i in words:
    if len(i) in grouper:
        grouper[len(i)].append(i)
    else:
        grouper[len(i)] = [i]

print(grouper)
```