6. Write a Python program using **for loop** to perform the following **string and list operations**:

a) Count the number of characters (character frequency) in a string.

```
# Prompt the user to enter a string
str = input("Enter a string:")

# Create an empty dictionary to store character frequencies
word = {}

# Loop through each character in the input string
for char in str:
    # If the character is already in the dictionary, increase its count by 1
    if char in word:
        word[char] += 1
    # If the character is not in the dictionary, add it with an initial count
of 1
    else:
        word[char] = 1

# Print a header message
print("Character frequency:")

# Loop through each key-value pair in the dictionary
for char, count in word.items():
    # Print each character and its frequency
    print(f"{char}:{count}")
```

b) Write a Python program to count the occurrences of each word in a line of text.
Hint: use split() function and dictionary

```
# Ask the user to enter a line of text and split it into words wherever there
is a space
words = input("Enter a line of text:").split(' ')

# Create an empty dictionary to store word counts
c = {}

# Loop through each word in the list 'words'
for t in words:
    # If the word is already in the dictionary, increase its count by 1
    if t in c:
        c[t] += 1
    # If the word is not in the dictionary, add it with an initial count of 1
    else:
        c[t] = 1
```

```
# Print the dictionary containing words and their frequencies
print(c)
```

c) Add ‘ing’ at the end of a given string. If it already ends with ‘ing’, then add ‘ly’

```
# Ask the user to enter a string
str = input("Enter a string:")

# Check if the string already ends with 'ing'
if str.endswith("ing"):
    # If it ends with 'ing', add 'ly' to the end of the string
    str = str + "ly"
else:
    # If it does not end with 'ing', add 'ing' to the end of the string
    str = str + "ing"

# Print the modified string
print("Modified string:", str)
```

d) Accept a list of words and return length of longest word.

```
# Ask the user to enter a list of words separated by spaces
# The input is split into a list of words using split(" ")
list = input("Enter a list of words separated by spaces:").split(" ")

# Initialize a variable to store the length of the longest word (start with
0)
longest_length = 0

# Loop through each word in the list
for word in list:
    # Check if the current word is longer than the previous longest word
    if len(word) > longest_length:
        # Update the longest length
        longest_length = len(word)
        # Store the current word as the longest word
        long_word = word

# Print the longest word found in the list
print("The longest word is", long_word)

# Print the length of the longest word
print("The length of the longest word is:", longest_length)
```

e) Construct following pattern using nested loop

```
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*
```

```
# Ask the user to enter the number of rows for the star pattern
rows = int(input("Enter the number of rows:"))

# First loop: prints the upper half of the diamond (increasing pattern)
for i in range(1, rows + 1):
    # Inner loop: prints stars in each row
    for j in range(i):
        print("*", end=" ")    # Print stars on the same line separated by
space
    print()                    # Move to the next line after each row

# Second loop: prints the lower half of the diamond (decreasing pattern)
for i in range(rows - 1, 0, -1):
    # Inner loop: prints stars in each row
    for j in range(i):
        print("*", end=" ")    # Print stars on the same line separated by
space
    print()                    # Move to the next line after each row
```

f) Display the given pyramid with step number accepted from user.

Eg: N=4

```
1
2 4
3 6 9
4 8 12 16
```

```
# Ask the user to enter the number of steps for the pyramid pattern
steps = int(input("Enter the number of steps for the pyramid:"))

# Outer loop: controls the number of rows (from 1 to 'steps')
for i in range(1, steps + 1):
    # Inner loop: prints the multiplication results for each row
    for j in range(1, i + 1):
        print(i * j, end=" ")    # Print the product of i and j on the same
line, separated by spaces
    print()                      # Move to the next line after each row
```