session 2 (Exercises Series 1)

1.Calculate the Area of a Triangle

`Commenting is required for all lines of code. (Explain each comment line in both programming and conceptual terms. An example is provided.)`

Problem Statement:

Given that `a`, `b`, and `c` are the sides of a triangle:

- `a` is fixed at 5.
- `b` is fixed at 6.1.
- `c` is entered by the user (7).

Formulas to Calculate the Area:

Formula for the semi-perimeter:

$$s = (a + b + c)/2$$

Formula for the area of the triangle:

$$area = (s * (s - a) * (s - b) * (s - c)) * *0.5$$

What does this part of the code `'%0.2f'` % do? (Be sure to comment on its functionality)

To understand this example, you should have the knowledge of the following Python programming topics:

- 0. Python Basic Output
- 1. Variables and Data Types
- 2. Taking Input from the User

In [ ]:
```
# Python Program to find the area of triangle

# Variables
a = 5 #An int variable (representing one of the sides of the triangle)
...

# Uncomment below to take inputs from the user
...

# calculate the semi-perimeter
...

# calculate the area
...

print('The area of the triangle is %0.2f' %area) #...
```

2.Even or Odd Checker with Exit Condition

`Commenting is required for all lines of code.`

Problem Statement:

Write a Python program that continuously accepts numbers from the user and determines whether the entered number is `even` or `odd`. The program should stop running when the user inputs `0`. (This means that it will always run until the number zero is entered)

Your program should:

1.Prompt the user to enter an integer.

2.If the number is:

- `0`, display a message indicating the program is exiting and terminate the loop.
- `Even`, display the message is Even.
- `Odd`, display the message is Odd.

3.Repeat this process until the user enters 0.

To understand this example, you should have the knowledge of the following Python programming topics:

- 0. Python Basic Output
- 1. Variables and Data Types
- 2. Taking Input from the User
- 3. Conditionals
- 4. Loops

In [ ]:
```
# Even or Odd Checker with Exit Condition

...
```

3.Recursive Factorial Calculator

`Commenting is required for all lines of code.`

Write a program to calculate the factorial of a number using recursion. Your program should:

1.Define a recursive function `factorial(x)` that:

- Returns `1` if the input is `0` or `1` (base case).
- Otherwise, calculates the factorial by calling itself with `x - 1`.

2.Prompt the user to input a non-negative integer.

3.Call the factorial function with the user's input.

4.Print the factorial of the number.

To understand this example, you should have the knowledge of the following Python programming topics:

- 0. Python Basic Output
- 1. Variables and Data Types
- 2. Taking Input from the User
- 3. Conditionals
- 5. Functions

In [ ]:
```
# Python program to find the factorial of a number provided by the user
# using recursion

def factorial(x):
    """This is a recursive function
    to find the factorial of an integer"""

    if ...:
        return 1
    else:
        # recursive call to the function
        return (...)


# to take input from the user (must num is int)
num = int(...)

# call the factorial function
```

```
result = factorial(num)

print("The factorial of", num, "is", result)
```