Lab 11

Conditional Structure

Objective:

The objective of this lab will be to learn about conditional statements with the help of examples and learning tasks.

Activity Outcomes:

The activities provide hands - on practice with the following topics
- Implement an if statement.
- Implement an if-else statement.
- Implement an if-elif statement
- Nest if-else statements.

Instructor Note:

As a pre-lab activity, read Chapter 8 from the textbook "Python Basics: A Practical Introduction to Python 3, 2021".

1) Useful Concepts

Condition statements allow us to write code that behaves differently in different scenarios. e.g let's consider a calculator. A calculator would not always calculate the sum of two numbers. It would calculate the result based on the operation selected by us. This is made possible using conditional statements.

1. The most basic conditional statement is an if statement. The syntax of an if statement is given below. The code inside the if statement would only execute if the condition is fulfilled i.e the condition inside the round brackets returns true.

```
if(<condition>):
    // some code
```
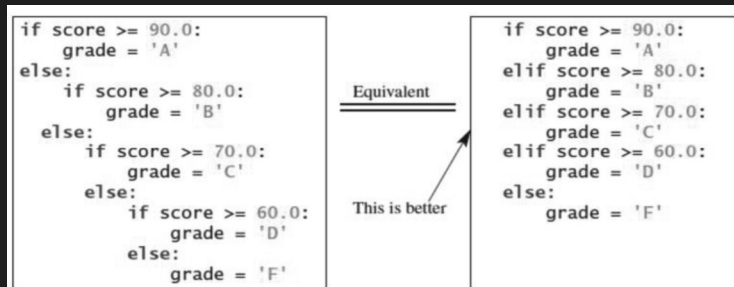
2. We can have another scenario in which in one condition we want to do one thing but in another condition, we want to do something else. This can be done by using if-else. The syntax is given under. The else statement runs only when the condition corresponding to the if block returns false.

```
if(<condition>):
    //some                                                  code
else:
    //some other code
```

3. When we have multiple conditions and we want to write different code for each of them, we can use if elif else. If we have 3 conditions lets say, the first condition would be checked using an if statement, the second with the elif statement and then third can either be checked with an elif again or just else as there is no other scenario.

```
if(<condition_1>):
    //some                                                  code
elif(<condition_2>):
    //                  condition                  2        code
elif(<condition_3>):
    //                  condition                  3        code
else:
    //some other code
```

4. The nested if statement can be used to implement multiple alternatives. The statement given in below Figure, for instance, assigns a letter value to the variable grade according to the score, with multiple alternatives.

```
if score >= 90.0:
    grade = 'A'
else:
    if score >= 80.0:
        grade = 'B'
    else:
        if score >= 70.0:
            grade = 'C'
        else:
            if score >= 60.0:
                grade = 'D'
            else:
                grade = 'F'
```

Equivalent

This is better

```
if score >= 90.0:
    grade = 'A'
elif score >= 80.0:
    grade = 'B'
elif score >= 70.0:
    grade = 'C'
elif score >= 60.0:
    grade = 'D'
else:
    grade = 'F'
```

2) Solved Lab Activites

Sr.No	Allocated Time	Level of Complexity	CLO Mapping
1	15	Low	CLO-7
2	15	Medium	CLO-7
3	15	Medium	CLO-7
4	15	Medium	CLO-7

Activity 1:

Python program to illustrate an if statement
Solution:

```
x = 4
if(x==3):
    print('Lions are the king of the jungle')


if(x==4):
    print("Bears eat honey")
```

Output

```
Bears eat honey
```

Activity 2:

Python program to illustrate an if else statement

```
x = 4
if(x==3):
    print('Lions are the king of the jungle')
else:
    print("Bears eat honey")
```

Output

```
Bears eat honey
```

Activity 3:

Python program to illustrate a function definition with return

```
x = 4
```

```
if(x==3):
    print('Lions are the king of the jungle')
elif(x==4):
    print('Canberra is the capital of Australia')
else:
    print("Bears eat honey")
```

Output

```
Canberra is the capital of Australia
```

Activity 4:

Python program to illustrate nested if else statements

```
if(x<=2 and y<20):
    print('The numbers x and y fall under the criteria')
    sum = x + y
    if(sum<50):
        print('The sum of x and y is:',sum)
else:
    print('The numbers x and y dont fall under the criteria')
```
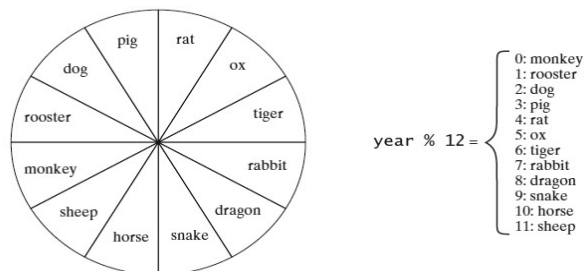
Output

```
The numbers x and y fall under the criteria
The sum of x and y is: 12
```

Activity 5:

Write a program to find out the Chinese zodiac sign for a given year. The Chinese zodiac sign is based on a 12-year cycle, and each year in this cycle is represented by an animal—monkey, rooster, dog, pig, rat, ox, tiger, rabbit, dragon, snake, horse, and sheep

year % 12 =
0: monkey
1: rooster
2: dog
3: pig
4: rat
5: ox
6: tiger
7: rabbit
8: dragon
9: snake
10: horse
11: sheep

```
year = eval(input("Enter a year: "))
2 zodiacYear = year % 12
3 if zodiacYear == 0:
4 print("monkey")
5 elif zodiacYear == 1:
6 print("rooster")
7 elif zodiacYear == 2:
8 print("dog")
9 elif zodiacYear == 3:
10 print("pig")
11 elif zodiacYear == 4:
12 print("rat")
13 elif zodiacYear == 5:
14 print("ox")
15 elif zodiacYear == 6:
16 print("tiger")
17 elif zodiacYear == 7:
18 print("rabbit")
19 elif zodiacYear == 8:
20 print("dragon")
21 elif zodiacYear == 9:
22 print("snake")
23 elif zodiacYear == 10:
24 print("horse")
25 else:
26 print("sheep")
```

Output

```
Enter a year: 1963
rabbit
Enter a year: 1877
Ox
```

3) Graded Lab Tasks

Note: The instructor can design graded lab activities according to the level of difficulty and complexity of the solved lab activities. The lab tasks assigned by the instructor should be evaluated in the same lab.

Lab Task 1

Write a program to check whether an integer is positive, negative, or zero

Lab Task 2

Write a   program to input marks of five subjects Physics, Chemistry, Biology, Mathematics, and Computer. Calculate percentage and grade according to following:
Percentage >= 90% : Grade A
Percentage >= 80% : Grade B
Percentage >= 70% : Grade C
Percentage >= 60% : Grade D
Percentage >= 40% : Grade E
Percentage < 40% : Grade F

Lab Task 3

Write a program to check whether the triangle is equilateral, isosceles or scalene triangle.

Lab Task 4

Write a dummy authentication system program in which you accept user inputs for email and password. Let's say the correct email and password are abc@gmail.com and abc respectively. If the email and password entered are correct it should display "User is logged in". If the email is correct, then prompt the user that the password is not correct. If the password is correct then prompt the user to enter the correct email. If both are incorrect then display the corresponding message

Lab Task 5:

Write a program to check whether a year is a leap year or not.