Orange County Community College

Computer Science and Technology Department

csc 138 - Scripting

Laboratory Exercise 3

Name: _____Alex DeGhetto_____

Date: _____3/8/2023_____

Objectives:
- Understand conditional branching.
- Demonstrate the ability to design and implement if statements.

Procedures:

1. Log in to your Linux box and open a terminal. Start a Python shell.

Conditional Branching (if)
Conditional branching allows us to make **decisions** or ask questions in our code. Normally, code operates **sequentially**, with one instruction being executed after another, in order. However, decisions or conditional branches allow us to select different paths during different instances or runs of our program. Recall that a **condition** is an expression that can be decided to be true or false, that is, it results in a **Boolean** value. Generally, any relational or logical operation can be used as a condition, since those operations return true or false.

2. Given the following variable assignments:
```
a = 5
b = 3
c = 10
d = 4
```
Determine the value of the following expressions:

Expression	Value
a > c	_____0_____
b < d	_____1_____
a + b < c - d	_____0_____
3 * a <= c + d	_____1_____
a > b and b < d	_____1_____
a * b > c and c - d > a	_____1_____
a < c or b * b > c	_____1_____
a * b > c + d and b * d > c + a	_____0_____
a * b > c + d and not (b * d > c + a)	_____1_____

Recall that **conditional branching** allows us to take multiple paths through our code. They essentially allow us to ask a question or make a decision and take action based on that decision. The basic conditional branching statement in Python is the **if** statement. Its basic syntax is:

   if *condition* :
     statement(s)

where the **condition** is some expression that can be decided to be true or false (we often call this a **Boolean** value).
Some examples:

```
if num < 10:
     print('Less Than 10')

if num <= num2:
     print(num2, ' is larger')
else:
     print(num, ' is larger')

animal = input('Type an animal: ')
if animal == 'dog':
     print('woof')
elif animal == 'cat':
     print('meow')
elif animal == 'bird':
     print('tweet')
```

2. Again, given the following variable assignments:

      a = 5   b = 3   c = 10   d = 4

Determine the output of the following sets of statements:

```
if a * b > c + d:                                    _____a * 5_____
     print( a * 5 )
else:
     print( c * 5 )

if a > b and c > d:                                  _____True_____
     print( 'True' )
else:
     print('Not True')

if a < b or c > d and d > b:                         _____Yes_____
     print( 'Yes' )
else:
     print( 'No' )

if a * b - c > b + d or c - b < a + d:               _____First_____
     print('First')
else:
     print('Second')
```

3. Write scripts that solve the following problems. Make sure to write complete scripts with appropriate comments. Attach copies of each script to this lab sheet.

   A.   Read in a numeric grade from the keyboard. Determine whether or not the grade is passing and write an appropriate message to the screen.

Grade Letter Chart		
93-100 A	80-82 B-	67-69 D+
90-92 A-	77-79 C+	63-66 D
87-89 B+	73-76 C	60-62 D-
83-86 B	70-72 C-	0-59 F

```
num = input("Enter a number  for your test grade: ")
num = int(num)
if (num >= 0 and num <= 100):
 if (num < 65):
  print("You Have Failed")
 elif (num > 65):
  print("You Passed")
else:
 print("Enter a number that is within 0 - 100: ")
```

B. Read in a numeric grade from the keyboard. Then, determine the letter grade (A, B, C, D, or F) based on the numeric grade and print it to the screen.

```
num = input("Enter a number  for your test grade: ")
num = int(num)
if (num >= 0 and num <= 100):
 if (num < 60):
  print("You Have Failed")
 elif (num < 63):
  print("You got a D-")
 elif (num < 67):
  print("You got a D")
 elif (num < 70):
  print("You got a D+")
 elif (num < 73):
  print("You got a C-")
 elif (num < 77):
  print("You got a C")
 elif (num < 80):
  print("You got a C+")
 elif (num < 83):
  print("You got a B-")
 elif (num < 77):
  print("You got a B")
 elif (num < 90):
  print("You got a B+")
 elif (num < 93):
  print("You got an A-")
 elif (num < 101):
  print("You got an A")
 else:
  print("Enter a number that is within 0 - 100: ")
else:
 print("Enter a number that is within 0 - 100: ")
```

C. Read in three numbers from the keyboard. Determine which number is the largest and which number is the smallest and print these values to the screen with an appropriate message.

```
print("Enter 3 values")
a = input("Value 1: ")
b = input("Value 2: ")
c = input("Value 3: ")
a = int(a)
b = int(b)
```

```
c = int(c)

print(a, b, c)

if (a > b and a > c): # A is the greatest
  if (b > c):
    print("Value 1 has the greatest value at: ", a)
    print("Value 2 has a value of: ", b)
    print("Value 3 has the smallest value at: ", c)
  elif (c > b):
    print("Value 1 has the greatest value at: ", a)
    print("Value 2 has the smallest value at: ", b)
    print("Value 3 has a value of: ", c)
if (b > a and b > c): # B is  the greatest
  if (a > c):
    print("Value 1 has a value of: ", a)
    print("Value 2 has the greatest value at: ", b)
    print("Value 3 has the smallest value at: ", c)
  elif (c > a):
    print("Value 1 has the smallest value at: ", a)
    print("Value 2 has the greatest value at: ", b)
    print("Value 3 has a value of: ", c)
if (c > a and c > b): # C is  the greatest
  if (a > b):
    print("Value 1 has a value of: ", a)
    print("Value 2 has the smallest value at: ", b)
    print("Value 3 has the greatest value at: ", c)
  elif (b > a):
    print("Value 1 has the smallest value at: ", a)
    print("Value 2 has a value of: ", b)
    print("Value 3 has the greatest value at: ", c)
```

D. Given a fulcrum system like the one to the right, write a complete script that determines whether the system will balance. At the keyboard, prompt the user for the values for the two weights and distances, and output whether or not the systems will balance. Recall that the system will balance when w_1 x d_1 = w_2 x d_2 (you may assume that the balance beam has no weight).
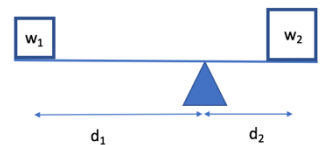

```
weight1 = input("Enter a Value for the Weight of the first object (in lbs): ")
dist1 = input("Enter a Value for the Distance of the first object (in meters): ")
weight2 = input("Enter a Value for the Weight of the second object (in lbs): ")
dist2 = input("Enter a Value for the Distance of the second object (in meters): ")
weight1 = int(weight1)
weight2 = int(weight2)
dist1 = int(dist1)
dist2 = int(dist2)
if(weight1 * dist1 == weight2 * dist2):
  print("The objects will balance")
else:
  print("The objects will not balance")
```

E. Ask the user to input a number and determine if the number is even or add. Hint. Use the nodule operator.

```
num = int(input("Enter any number to see if it is odd or even: "))
```

```python
if (num % 2) == 0:
  print("The number you entered is even")
else:
  print("The number you entered is odd")
```

F. Combine the programs you have written above into a single program with a menu system. The program should print a menu displaying appropriate choices and allow the user to select one of the operations you created above.

```python
print("Select an option from the menu below: ")
print("1. Check If Passing Or Failing")
print("2. Check Letter Grade of Test ")
print("3. Greatest, Smallest of 3 numbers")
print("4. Fulcrum System")
print("5. Odd Or Even")

choice = int(input())
if(choice == 1):
  num = input("Enter a number  for your test grade: ")
  num = int(num)
  if (num >= 0 and num <= 100):
    if (num < 65):
      print("You Have Failed")
    elif (num >= 65):
      print("You Passed")
  else:
    print("Enter a number that is within 0 - 100: ")
elif(choice == 2):
  num = input("Enter a number  for your test grade: ")
  num = int(num)
  if (num >= 0 and num <= 100):
    if (num < 60):
      print("You Have Failed")
    elif (num < 63):
      print("You got a D-")
    elif (num < 67):
      print("You got a D")
    elif (num < 70):
      print("You got a D+")
    elif (num < 73):
      print("You got a C-")
    elif (num < 77):
      print("You got a C")
    elif (num < 80):
      print("You got a C+")
    elif (num < 83):
      print("You got a B-")
    elif (num < 77):
```

```python
      print("You got a B")
    elif (num < 90):
      print("You got a B+")
    elif (num < 93):
      print("You got an A-")
    elif (num < 101):
      print("You got an A")
    else:
      print("Enter a number that is within 0 - 100: ")
  else:
    print("Enter a number that is within 0 - 100: ")
elif(choice == 3):
  print("Enter 3 values")
  a = input("Value 1: ")
  b = input("Value 2: ")
  c = input("Value 3: ")
  a = int(a)
  b = int(b)
  c = int(c)
  print(a, b, c)
  if (a > b and a > c): # A is the greatest
    if (b > c):
      print("Value 1 has the greatest value at: ", a)
      print("Value 2 has a value of: ", b)
      print("Value 3 has the smallest value at: ", c)
    elif (c > b):
      print("Value 1 has the greatest value at: ", a)
      print("Value 2 has the smallest value at: ", b)
      print("Value 3 has a value of: ", c)
  if (b > a and b > c): # B is  the greatest
    if (a > c):
      print("Value 1 has a value of: ", a)
      print("Value 2 has the greatest value at: ", b)
      print("Value 3 has the smallest value at: ", c)
    elif (c > a):
      print("Value 1 has the smallest value at: ", a)
      print("Value 2 has the greatest value at: ", b)
      print("Value 3 has a value of: ", c)
  if (c > a and c > b): # C is  the greatest
    if (a > b):
      print("Value 1 has a value of: ", a)
      print("Value 2 has the smallest value at: ", b)
      print("Value 3 has the greatest value at: ", c)
    elif (b > a):
      print("Value 1 has the smallest value at: ", a)
      print("Value 2 has a value of: ", b)
      print("Value 3 has the greatest value at: ", c)
elif(choice == 4):
  weight1 = input("Enter a Value for the Weight of the first object (in lbs): ")
```

```python
dist1 = input("Enter a Value for the Distance of the first object (in meters): ")
weight2 = input("Enter a Value for the Weight of the second object (in lbs): ")
dist2 = input("Enter a Value for the Distance of the second object (in meters): ")
weight1 = int(weight1)
weight2 = int(weight2)
dist1 = int(dist1)
dist2 = int(dist2)
if(weight1 * dist1 == weight2 * dist2):
    print("The objects will balance")
else:
    print("The objects will not balance")
elif(choice == 5):
    num = int(input("Enter any number to see if it is odd or even: "))
    if (num % 2) == 0:
        print("The number you entered is even")
    else:
        print("The number you entered is odd")
```