Homework 2 – Conditions and Loops

Due on Sunday, March 12th, 2017 11:59 PM

Problem 1 (5 points). What will be the output of the following code if:

I.	x = 3 and y = 2	`x is 3`
II.	II. x = 3 and y = 4	`z is 7`
III.	III. x = 2 and y = 2	`<no output>`

```
if x > 2:
        if y > 2:
            z = x + y
            print("z is", z)
        else:
            print("x is", x)
```

Problem 2 (10 points). Write a program which asks the user to enter their age and outputs if they are an infant, a child, a teenager or an adult. Use the following rules:
1) ages 1 or less means the person is an infant
2) ages older than 1 but younger then thirteen means the person is a child
3) ages at least thirteen but younger than twenty means the person is a teenager
4) ages twenty and over means the person is an adult

Sample program output:
Please your age: 14
You are a teenager

Problem 3 (10 points). Write a program which gives the option between doing 3 things:
1) Add two numbers
2) Multiply three numbers
3) Multiply a number and a string
Ask the user to choose an option. Output "Invalid option" if the user enters something apart from 1, 2 or 3. Otherwise depending on what the user enters ask the user again for inputs to perform the required choice and output the answer.

Sample program output 1:
You can choose between:
1) Adding two numbers

```
2) Multiplying three numbers
3) Multiplying a number and a string
Please choose an option: 2
Please enter number 1: 2
Please enter number 2: 3
Please enter number 3: 5
The answer is 30
```

Sample program output 2:

```
You can choose between:
1) Adding two numbers
2) Multiplying three numbers
3) Multiplying a number and a string
Please choose an option: 3
Please enter a string: hello
Please enter a number: 3
The answer is hellohellohello
```

Problem 4 (15 points). Analyze the following code. If you (hypothetically) check the condition *count < 100* at the positions in the code designated as *# Point A*, *# Point B*, and *# Point C*, will the condition evaluate to always *True*, always *False*, or sometimes *True* and sometimes *False*? Give your answer for all the three positions.

```
count = 0
while count < 100:
      # Point A        Always True (we entered the body of the loop)
      print("Programming is fun!")
      count += 1
      # Point B        Sometimes True (False on the last iteration)
# Point C              Always False (we have already exited the loop)
```

Problem 5 (10 points). How many times does the body of the while loop repeat? What is the output of each loop?

```
i = 1
while i < 10:
    if i % 2 == 0:
        print(i)
    i += 1
```

```
The body of the while loop will repeat 9 times.
Iteration  Output
1          no output
2          2
3          no output
4          4
5          no output
6          6
7          no output
8          8
9          no output
```

Problem 5 (15 points). Write a python script to calculates a person's body mass index (BMI). The BMI is often used to determine whether a person is overweight or underweight for his or her height. BMI is calculated with the following formula:

$$BMI = \frac{weight}{(height)^2} \times 703$$

Weight is measured in pounds (lb) and height is measured in inches (in). The program should ask the user to enter his or her weight and height and then display the user's BMI. The program should also display a message indicating whether the person has optimal weight, is underweight, or is overweight based on the given table.

BMI > 25	Overweight
18.5 <= BMI <= 25	Normal
BMI < 18.5	Underweight

Sample program output:

```
Enter weight (lb): 134
Enter height (in): 66
BMI: 21.62
You are normal.
```

Problem 6 (10 points). Write a program which asks the user to enter a number and prints its multiplication table upto 10.

Sample program output:

```
Please enter a number: 9
9 X 1 = 9
9 X 2 = 18
9 X 3 = 27
9 X 4 = 36
9 X 5 = 45
9 X 6 = 54
9 X 7 = 63
9 X 8 = 72
9 X 9 = 81
9 X 10 = 90
```

Problem 7 (10 points). Given a number n calculate n! using a while loop. n!, called n factorial, is defined as the product of numbers 1 through n.
For example 4! = 1 X 2 X 3 X 4 = 24
For example 2! = 1 X 2 = 2
For example 5! = 1 X 2 X 3 X 4 X 5 = 120

Sample program output:
Please enter n: 3
3 factorial is 6

Problem 8 (15 points). Write a program which asks the user for two numbers and calculates the first number raised to the second number.

Sample program output:
Please enter number 1: 2
Please enter number 2: 5
2 ** 5 is 32

*Note: Do not use the ** operator or the pow() function use loops and multiplication to calculate the answer*

Extra Credit
Problem 9 (25 points). Given a binary number convert the number to its decimal equivalent. If the number inputted by the use contains any digits apart from 0 or 1 output and error message.

Sample program output 1:
Please enter the binary number: 10010
The decimal equivalent of 10010 is 18

Sample program output 2:
Please enter the binary number: 111
The decimal equivalent of 111 is 7

Sample program output 3:
Please enter the binary number: 2019
The decimal equivalent of 2019 is not a binary number