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# **Department of Computing**

# **CS110: Fundamentals of Computer Programming**

# **Lab 05: While Loop**

**CLO1: Understand the syntax and semantics of different programming constructs**

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**Master Solution**

**Lab 05: While Loop**

**Introduction**

The purpose of this lab is to get familiar with usage of while loop in Python.

**Objectives**

The objective of this lab is to design solution using while loop in Python Scripted Mode.

**Tools/Software Requirement**

Python IDLE

**Description:**

**While Loop:**

While loop is the simplest loop, which executes one or more statements, if the given condition remains true. It is useful when the number of iterations is not known in advance.

| while «expression»:  «block» |
| --- |

**Lab Tasks:**

**Using only the programming techniques that you have learned so far, perform the following tasks:**

**Note: All the tasks of this lab should be performed in Python scripted mode only.**

**Task 1:** Write a program that asks the user about the number of values he/she wants to enter. Than enter the values as per the required number, calculate its sum and identify the smallest value among them. The sample output is as follow:

Graphical user interface, text, application, chat or text message

Description automatically generated

**Task 2:** The factorial function is used frequently in probability problems. The factorial of a positive integer n (written n! and pronounced “n factorial”) is equal to the product of the positive integers from 1 to n.

Write a function factorial that accepts an integer as parameter and returns its factorial.

Using the factorial function, write a program that evaluates the factorials of the integers from 1 to 5. Print the results in tabular format as following.

Graphical user interface, text

Description automatically generated

**Task 3:** Write a program that plays an incredibly stupid number-guessing game. The user will try to guess the secret number until they get it right. That means it will keep looping as long as the guess is different from the secret number. You must store the secret number in a variable, and use that variable throughout. The secret number itself must not appear in the program at all, except in the one line where you store it into a variable. Sample output is as following:

Graphical user interface, text, application, chat or text message

Description automatically generated

**Task 4:** The greatest common divisor (GCD) of two integers is the largest integer that evenly divides each of the two numbers. Write function gcd that returns the greatest common divisor of two integers.

Use the gcd function in your program to determine the GCD of the numbers in the sample output:

Text

Description automatically generated

**Task 5:** An integer is said to be prime if it is divisible only by 1 and itself. For example, 2, 3, 5 and 7 are prime, but 4, 6, 8 and 9 are not.

1. Write a function that determines if a number is prime.

Text

Description automatically generated

1. Use this function in a program that determines and prints all the prime numbers between 1 and 10,000.

Text

Description automatically generated

**Task 6:** Write a code that prints on screen all the 4-digit Armstrong numbers.

Graphical user interface, text

Description automatically generated

**Task 7:** Write a program that outputs 100 lines, numbered 1 to 100, each with your name on it. The output should look like the output below:

Text, letter

Description automatically generated

**Task 8:** Write a program that prints out a list of the integers from 1 to 20 and their squares. The output should look like this:

Graphical user interface, text, application

Description automatically generated

**Task 9:** Write a program that uses a for loop to print the numbers 8, 11, 14, 17, 20, . . . , 83, 86, 89.



**Task 10:** Write a program that asks the user for their name and how many times to print it. The program should print out the user’s name the specified number of times.

Graphical user interface, text, application

Description automatically generated

**Task 11:** Use a for loop to print a box like the one below. Allow the user to specify how wide and how high the box should be.

Text

Description automatically generated

**Task 12:** Use a for loop to print a triangle like the one below. Allow the user to specify how high the

triangle should be.

**Text

Description automatically generated**

**Task 13:** Use for loops to print a diamond like the one below. Allow the user to specify how high the

diamond should be.

Text

Description automatically generated

**Task 14:** Write a program that prints a giant letter A like the one below. Allow the user to specify how large the letter should be.

**Text

Description automatically generated**