Istanbul Medipol University
School of Engineering and
Natural Sciences
Computer Engineering

Fall 2019 – Assignment #4
Introduction to Programming
Assignment Date: 28.10.2019
Due Date: 04.11.2019

Programming Assignment #4

Put all of you code into the same PYHTON file according to file name conventions given in http://www.akyokus.com/fall2019/ip/assignments.html. Programming assignment solutions should be submitted in the following format:

File Name: COE-64160099-KAYA-A1.py

```
##########################################################################################
#  Name:         Ali Cokcalışır
#  Student ID:   6321211
#  Department:   Computer Engineering
#
#  Assignment ID: A1
##########################################################################################

##########################################################################################
#  QUESTION I
#  Description:
#  Body mass index (BMI) is a measure of health #  based on weight. It can be calculated by
#  taking your weight in kilograms and # dividing it by the square of your height in meters.
#  Write a program that prompts # the user to enter a weight in pounds and height in inches
#  and displays the BMI. Note that one pound is 0.45359237 kilograms and one inch is
#  0.0254 meters.
#
#  Sources:
#  Give references for the sources that you used in your program if there are any
#
##########################################################################################

print("\n")
print("SOLUTION OF QUESTION I:")
print("********************************************************************************")
# Prompt the user to enter weight in pounds
weight = eval(input("Enter weight in pounds: "))

# Prompt the user to enter height in inches
height = eval(input("Enter height in inches: "))

KILOGRAMS_PER_POUND = 0.45359237  # Constant
METERS_PER_INCH = 0.0254  # Constant

# Compute BMI
weightInKilograms = weight * KILOGRAMS_PER_POUND
heightInMeters = height * METERS_PER_INCH
bmi = weightInKilograms / (heightInMeters * heightInMeters)

# Display result
print("BMI is", format(bmi, ".2f"))
if bmi < 18.5:
    print("Underweight")
elif bmi < 25:
    print("Normal")
elif bmi < 30:
    print("Overweight")
else:
    print("Obese")
```

```
#############################################################################################
#  QUESTION II
#  Description:
#  You can use the math functions to solve many computational problems. Given the three
#  vertices of a triangle, for example, you can compute the angles by using
#  math formulas. The following program asks user to enter the coordinates of a triangle,
# then it computes its angles.
#
#  Sources:
#  Give references for the sources that you used in your program if there are any
#
#############################################################################################

print("\n")
print("SOLUTION OF QUESTION II:")
print("*********************************************************************************")
import math

x1, y1, x2, y2, x3, y3 = eval(input("Enter six coordinates of three points \
separated by commas like x1, y1, x2, y2, x3, y3: "))

a = math.sqrt((x2 - x3) * (x2 - x3) + (y2 - y3) * (y2 - y3))
b = math.sqrt((x1 - x3) * (x1 - x3) + (y1 - y3) * (y1 - y3))
c = math.sqrt((x1 - x2) * (x1 - x2) + (y1 - y2) * (y1 - y2))

A = math.degrees(math.acos((a * a - b * b - c * c) / (-2 * b * c)))
B = math.degrees(math.acos((b * b - a * a - c * c) / (-2 * a * c)))
C = math.degrees(math.acos((c * c - b * b - a * a) / (-2 * a * b)))

print("The three angles are ", round(A * 100) / 100.0,
      round(B * 100) / 100.0, round(C * 100) / 100.0)


#############################################################################################
#  QUESTION III
#  Description:
#  Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt
#  ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation
#  ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in
#  reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.
#  Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit
#  anim id est laborum
#
#  Sources:
#  Give references for the sources that you used in your program if there are any
#
#############################################################################################
print("\n")
print("SOLUTION OF QUESTION III:")
print("*********************************************************************************")
```

Submit your programming assignment through the Google classroom IntProg-Fall2019 (https://classroom.google.com/c/NDMyNjgzODE5MjNa).

NOTE: YOU ARE ONLY ALLOWED TO SEND YOUR HOMEWORK IN '.py' OR '.zip' FILE. DO NOT FORGET TO FOLLOW THE NAMING FORMAT. DO NOT COPY CODES FROM YOUR FRIENDS. IF IT OCCURS, THEN YOU AND YOUR FRIEND WILL GET 0 (ZERO) BECAUSE OF THE PLAGIARISM, TRY YOUR BEST.

QUESTION I:

(Sum the digits in an integer) Write a function that computes the sum of the digits in an integer. Use the following function header:

def sumDigits(n):

For example, sumDigits(234) returns 9

QUESTION II:

Write a function to display a pattern as follows:

```
                1
              2 1
            3 2 1
          ...
        n n-1 ... 3 2 1
```

The function header is

def displayPattern(n):

Write a test program that prompts the user to enter a number n and invokes

displayPattern(n) to display the pattern.

QUESTION III:

Write a module that contains the following two functions:

Converts from Celsius to Fahrenheit

def celsiusToFahrenheit(celsius):

Converts from Fahrenheit to Celsius

def fahrenheitToCelsius(fahrenheit):

The formulas for the conversion are:

celsius = (5 / 9) * (fahrenheit – 32)

fahrenheit = (9 / 5) * celsius + 32

Write a test program that invokes these functions to display the following tables:

Celsius	Fahrenheit		Fahrenheit	Celsius
40.0	104.0	|	120.0	48.89
39.0	102.2	|	110.0	43.33
...				
32.0	89.6	|	40.0	4.44
31.0	87.8	|	30.0	-1.11

QUESTION IV:

You can approximate e by using the following series:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \ldots + \frac{1}{i!}$$

Write a program that displays the e value for i = 10000, 20000, . . ., and 100000.

(Hint: Since $i! = i \times (i - 1) \times \ \ldots \ \times 2 \times 1$, then $\frac{1}{i!}$ is $\frac{1}{i(i-1)!}$. Initialize `e` and `item` to be `1` and keep adding a new `item` to `e`. The new item is the previous item divided by `i` for `i = 2, 3, 4, . . .`)