Istanbul Medipol University
School of Engineering and
Natural Sciences
Computer Engineering

Fall 2019 – Assignment #2
Introduction to Programming
Assignment Date: 14.10.2019
Due Date: 21.10.2019

Programming Assignment #2

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).

QUESTION I:

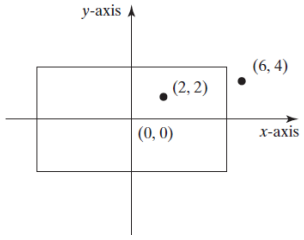
The Fast Freight Shipping Company charges the following rates:

Weight of Package	**Rate per Pound**
2 pounds or less	$1.50
Over 2 pounds but not more than 6 pounds	$3.00
Over 6 pounds but not more than 10 pounds	$4.00
Over 10 pounds	$4.75

Write a program that asks the user to enter the weight of a package then displays the shipping charges.

QUESTION II:

(*Geometry: point in a rectangle?*) Write a program that prompts the user to enter a point **(x, y)** and checks whether the point is within the rectangle centered at (**0**, **0**) with width **10** and height **5**. For example, (**2**, **2**) is inside the rectangle and (**6**, **4**) is outside the rectangle, as shown in the following Figure. (Hint: A point is in the rectangle if its horizontal distance to (**0**, **0**) is less than or equal to **10 / 2** and its vertical distance to (**0**, **0**) is less than or equal to **5.0 / 2**. Test your program to cover all cases.)



Here are two sample runs:

Enter a point with two coordinates: 2,2
Point (2.0, 2.0) is in the rectangle

Enter a point with two coordinates: 9,9
Point (9.0, 9.0) is not in the circle

QUESTION III:

(Decimal to hex) Write a program that prompts the user to enter an integer between 0 and 15 and displays its corresponding hex number. Here are some sample runs:

Enter a decimal value (0 to 15): 11
The hex value is B

Enter a decimal value (0 to 15): 5
The hex value is 5

Enter a decimal value (0 to 15): 55
Invalid input

QUESTION IV:

Write a program that computes π using the following series expansion.

$$\pi = 4\left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \cdots + \frac{(-1)^{i+1}}{2i - 1}\right)$$

Write a program that displays the π value for i = 100, 500, and 1000. Calculate the difference between the approximate π value that you calculated with the series formula and the π value using math library (use math.pi).