

Programming Assignment #7

Put all of your code into the same PYTHON 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

```
#####
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# 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 (30p) :

Generate a list of 200 random values in the range 1–99. Determine, print and remove duplicate values from the list. Your program should print

- the original list generated randomly,
- duplicate values, and
- the list without duplicates

(Hint: you may want to sort the list first.)

QUESTION II (30p) :

Write the missing functions *myAverage*, *myStandardDev*, *myMin*, and *myCorrelation* in the following code. The formulas for average (mean), standard deviation and correlation are given below.

$$\text{mean} = \frac{\sum_{i=1}^n x_i}{n} = \frac{x_1 + x_2 + \dots + x_n}{n}$$

$$\text{deviation} = \sqrt{\frac{\sum_{i=1}^n x_i^2 - \frac{\left(\sum_{i=1}^n x_i\right)^2}{n}}{n - 1}}$$

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}}$$

```
import math
import random

def myAverage(lst):

def myStandardDev(lst):

def myMin(lst):

def myCorrelation(x, y):

def main():
    aList = [10, 20, 30, 50, 80, 90, 100, 15, 125, 128, 150, 185, 200, 240, 260, 280]
    bList = [13, 25, 28, 45, 79, 85, 111, 115, 125, 256, 160, 195, 230, 270, 280, 320]
    cList = bList.copy()
    cList.reverse()
    dList = [random.randint(1,99) for x in range(len(aList))]

    print("Lists:")
    print("List A = " + str(aList))
    print("List B = " + str(bList))
    print("List C = " + str(cList))
    print("List D = " + str(dList))

    print()
    print("List A Average = " + str(myAverage(aList)))
```

```

print("Standart Deviation of List A = " + str(myStandardDev(aList)))
print("Minimum of List A = " + str(myMin(aList)))

print()
print("List B Average = " + str(myAvearage(aList)))
print("Standart Deviation of List B = " + str(myStandardDev(aList)))
print("Minimum of List B = " + str(myMin(aList)))

print()
print("Correlation of List A and B = " + str(myCorrelation(aList, bList)))
print("Correlation of List A and C = " + str(myCorrelation(aList, cList)))
print("Correlation of List A and D = " + str(myCorrelation(aList, dList)))

main()

```

OUTPUT:

Lists:

List A = [55, 20, 30, 50, 80, 90, 100, 15, 125, 128, 150, 185, 200, 240, 260, 280]

List B = [50, 25, 28, 45, 79, 85, 111, 115, 12, 256, 160, 195, 230, 270, 280, 320]

List C = [320, 280, 270, 230, 195, 160, 256, 12, 115, 111, 85, 79, 45, 28, 25, 50]

List D = [47, 46, 6, 53, 7, 63, 38, 49, 58, 2, 19, 30, 54, 59, 77, 30]

List A Average = 125.5

Standart Deviation of List A = 83.6211695684771

Minimum of List A = 15

List B Average = 141.3125

Standart Deviation of List B = 100.41894663732536

Minimum of List B = 12

Correlation of List A and B = 0.8702543666382547

Correlation of List A and C = -0.6922549809070749

Correlation of List A and D = 0.21883768049638322

QUESTION III (40p) :

Write a program that takes an integer argument n, and rolls 11 fair six-sided dice, n times. Use an integer array to tabulate the number of times each possible total (between 11 and 66) occurs. Then print a text histogram of the results, as illustrated below. (You can take n as 1000).

<Output>

```

11:
12:
13:
14:
15:
16:
17:
18: *
19: ****
20:
21: ***
22: *****
23: *******
24: *************
25: *****
26: *****
27: *****
28: *****
29: *****
30: *****
31: *****
32: *****
33: *****
34: *****
35: *****
36: *****
37: *****
38: *****
39: *****
40: *****
41: *****

```

```
42: *****
43: *****
44: *****
45: *****
46: *****
47: *****
48: ***
49: **
50:
51:
52: *
53:
54:
55:
56:
57:
58:
59:
60:
61:
62:
63:
64:
65:
66:
```

<End Output>