

Programming Assignment #3

QUESTION I:

Write a program that reads integers, finds the largest of them, and counts its occurrences. Assume that the input ends with number 0. Suppose that you entered 3 5 2 5 5 5 0; the program finds that the largest number is 5 and the occurrence count for 5 is 4. (Hint: Maintain two variables, max and count. The variable max stores the current maximum number, and count stores its occurrences. Initially, assign the first number to max and 1 to count. Compare each subsequent number with max. If the number is greater than max, assign it to max and reset count to 1. If the number is equal to max, increment count by 1.)

```
Enter a number (0: for end of input): 3 Enter
Enter a number (0: for end of input): 5 Enter
Enter a number (0: for end of input): 2 Enter
Enter a number (0: for end of input): 5 Enter
Enter a number (0: for end of input): 5 Enter
Enter a number (0: for end of input): 5 Enter
Enter a number (0: for end of input): 0 Enter
The largest number is 5
The occurrence count of the largest number is 4
```

QUESTION II:

Write a function that displays an n-by-n matrix using the following header:

```
def printMatrix(n):
```

Each element is 0 or 1, which is generated randomly. Write a test program that prompts the user to enter n and displays an n-by-n matrix. Here is a sample run:

```
Enter n: 3 Enter
0 1 0
0 0 0
1 1 1
```

QUESTION III:

An emirp (prime spelled backward) is a nonpalindromic prime number whose reversal is also a prime. For example, both 17 and 71 are prime numbers, so 17 and 71 are emirps. Write a program that displays the first 100 emirps. Display 10 numbers per line and align the numbers properly, as follows:

```
13 17 31 37 71 73 79 97 107 113
149 157 167 179 199 311 337 347 359 389
...
```

QUESTION IV:

A prime number is called a Mersenne prime if it can be written in the form for some positive integer p. Write a program that finds all Mersenne primes with and displays the output as follows:

p	$2^p - 1$
2	3
3	7
5	31
...	

QUESTION V:

Write a program in PYTHON that displays a menu as shown in the sample run and asks user to two numbers. You can enter **1**, **2**, **3**, or **4** for choosing an addition, subtraction, multiplication, or division. Depending operation type, you will evaluate the result of an operation. For a division operation such as **number1 / number2**, you should check **number2** so that it is not zero. Your program should be inside of a loop and exit loop whenever you enter 5.

<Output>

Select Operation:

1: Addition

2: Subtraction

3: Multiplication

4: Division

5: Exit

Enter a choice: 3 <enter>

Please, enter the first number: 20 <enter>

Please, enter the second number: 10 <enter>

Result of 20 * 10 = 30

Select Operation:

1: Addition

2: Subtraction

3: Multiplication

4: Division

5: Exit

Enter a choice: 1 <enter>

Please, enter the first number: 21 <enter>

Please, enter the second number: 11 <enter>

Result of 21 + 11 = 32

.

.

<End Output>

PROGRAMMING AND SUBMISSION FORMAT

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

```
#####
# Name:      Ali Cokcalısır
# 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>). If you do not have medipol e-mail, then submit it to medipolprog@gmail.com.