AI Programming
(CB2001103-059)
HW04

Note

For the following problems, write a program to solve the problem and display the answer. A possible output is shown in a example I/O section and responses to input statements appear green. Make sure you run scripts using Python 3.

Submission format

HW04_(NAME)**.zip** included:

- HW04_A_(NAME)**.py – CODE** for Problem A and sufficient **COMMENTS.**
- HW04_B_(NAME)**.py – CODE** for Problem B and sufficient **COMMENTS**.
- HW04_C_(NAME)**.py – CODE** for Problem B and sufficient **COMMENTS**.
- HW04_(NAME)**.pdf - SCREEN SHOT** of terminal that run example case.

Homework Policy

Late penalty: 20 points per 12 hours

Any cheating → 0 point for anyone involved

- Copying from a fellow student
- Copying from the Web or ChatGPT/ChatGPT-like apps.
- Working together with a group of students on this non-group assignment.

Problem A. Quiz Grades [30 points]

Problem

An instructor gives six quizzes with quiz grades 0 through 10, and drops the lowest grade. Write a program to find the average of the remaining five grades. A possible output is shown in the example I/O section below. The program should use a class named ***Quizzes*** that has an instance variable to hold a list of the six grades, a method named average, and a __***str***__ method.

Methods

- average(): calculates the average of grades.
- __str__(): returns as shown in the example I/O (Quiz average: 9.4).

Functions

- main(): declares an empty list **listOfGrades**, request 6 quiz grades as inputs, appends each of them to listOfGrades, and prints **Quizzes(listOfGrades)**

Restrictions

Quiz grades should be taken as float.

Use Skeleton Code.

Skeleton Code

```
Class Quizzes:
    def __init__(self, listOfGrades):
        ...
    def average(self):
        ...
    def __str__(self):
        ...

def main():
    ...

    q = Quizzes(listOfGrades)
    print(q)

main()
```

Example I/O

```
Enter grade on quiz 1: 9
Enter grade on quiz 2: 10
Enter grade on quiz 3: 5
Enter grade on quiz 4: 8
Enter grade on quiz 5: 10
Enter grade on quiz 6: 10
Quiz average: 9.4
```

Problem B. Reduce a Fraction **[30 points]**

Problem

Create a class named ***Fraction*** having instance variables for numerator and denominator and a class named ***IrreducibleFraction*** which inherits class ***Fraction***. Ensure your code follow the method descriptions described below.

Methods

- Fraction.__init__(): Initializer of the class Fraction
- Fraction.getNumerator(), getDenominator(): accessor of each local variable.
- Fraction.setNumerator(), setDenominator(): mutator of each local variable.
- Fraction.print(): print the Fraction class like example I/O below.
- IrreducibleFraction.__init__(): Initializer of the class IrreducibleFraction, you must use super() function to initialize the class variable and modify the class variable by dividing variable by their greatest common divisor calculated by IrreducibleFraction._GCD() methods.
- IrreducibleFraction._GCD(): returns the greatest common divisor (GCD) of two nonzero integers.
- IrreducibleFraction.print(): print the IrreducibleFraction like example I/O below.

Restrictions

Numerator and denominator should be taken as int.

Use Skeleton Code.

Do not modify main function.

Skeleton Code

```
class Fraction():
    def __init__(self, numerator=0, denominator=1):
        ...
    def getNumerator(self):
        ...
    def setNumerator(self, value):
        ...
    def getDenominator(self):
        ...
    def setDenominator(self, value):
        ...
    def print(self):
        ...

class IrreducibleFraction(Fraction):
    def __init__(self, numerator=0, denominator=1):
        ...
    def _GCD(self, m, n):
        ...
    def print(self):
        ...

def main():
    numerator = eval(input('Enter the Numerator: '))
    denominator = eval(input('Enter the Denominator: '))
    fraction = Fraction(numerator, denominator)
    fraction.print()
    reduced_fraction = IrreducibleFraction(numerator, denominator)
    reduced_fraction.print()

main()
```

Example I/O

```
Enter the numerator: 930
Enter the Denominator: 2170

The fraction is 930/2170
The reduced fraction is 3/7
```

Problem C. Rock, Scissors, Paper [40 points]

Problem

Write a program to play a three-game matches of "rock, scissors, paper" between a person and a computer. The program must use a class ***Human*** and ***Computer*** inherits from class Contestant. The class ***Contestant*** should have instance variables for ***name*** and ***score***. A possible output is shown in the example I/O section below, where the last line should be changed to "TIE" in case of a tie.

Methods

- Contestant.__init__(): initializer of the class Contestant.
- Contestant.getName(), getScore(): accessor of each local variable.
- Contestant.setName(), setScore(): mutator of each local variable.
- makeChoice(): Human requests a choice from rock, scissors, paper as input (repeats the request until the input is valid) and returns the choice. Computer randomly makes the choice and returns it.

Restrictions

Do not modify playGame(h, c) and judge(choice, choice) function.

Use random library to implement Computer.makeChoice method..

Skeleton Code

```
import random

class Contestant:
    def __init__(self, name="", score=0):
        ...
    def getName(self):
        ...
    def getScore(self):
        ...
    def setScore(self,value):
        ...

class Human(Contestant):
    def makeChoice(self):
        ...

class Computer(Contestant):
    def makeChoice(self):
        ...

def playGame(h, c):
    choiceH = h.makeChoice()
    choiceC = c.makeChoice()
    if choiceH == choiceC:
        pass
    elif judge(choiceH, choiceC):
        h.setScore(h.getScore() + 1)
    else:
        c.setScore(c.getScore() + 1)

def judge(choiceH, choiceC):
    if ((choiceH == 'rock' and choiceC == 'scissors') or
        (choiceH == 'paper' and choiceC == 'rock') or
        (choiceH == 'scissors' and choiceC == 'paper')):
        return True
    else:
        return False

def main():
    ...

main()
```

Example I/O

```
Enter name of human: Garry
Enter name of computer: alphaGo

Garry, enter your choice: rock
alphaGo chooses paper
Garry: 0, alphaGo: 1

Garry, enter your choice: potato
invalid choice potato

Garry, enter your choice: scissors
alphaGo chooses paper
Garry: 1, alphaGo: 1

Garry, enter your choice: paper
alphaGo chooses rock
Garry: 2, alphaGo: 1

GARRY WIN
```

```
Enter name of human: Garry
Enter name of computer: alphaGo

Garry, enter your choice: rock
alphaGo chooses paper
Garry: 0, alphaGo: 1

Garry, enter your choice: scissors
alphaGo chooses paper
Garry: 1, alphaGo: 1

Garry, enter your choice: paper
alphaGo chooses paper
Garry: 1, alphaGo: 1

TIE
```