Java Programming (COMP217009)

Spring, 2020

Instructor: Sangtae Ahn

Final Exam

- The first line in all your codes should type your student ID and name as a comment.

  ex) // 20201234 Sangtae Ahn

- Your code should satisfy all the given requirements.

Q1. (10 points)

Fill out the missing parts (marked as **// FILL OUT //**) to design a class named ***Location*** for finding maximal, minimal values and their locations in a two-dimensional array.

1) The class ***Location*** contains public data fields **row**, **column**, **maxValue**, and **minValue**
2) Public data fields **maxValue** and **minValues** are ***double*** data types and they store the maximal and minimal values in a two-dimensional array, respectively.
3) Public data fields **row** and **column** are ***int*** data types and they store indices for **maxValue** and **minValue** in a two-dimensional array.
4) Print **maxValue**, **minValue**, **row** and **column**.
5) Do not edit the code or rename the variables.
6) Submission File Name: **Q1_FindLocation.java**

Q2. (10 points)

According to the given UML, design a class named ***Rectangle*** to represent the width, height, area, and perimeter. Satisfy the following requirements.

1) Class name: ***Rectangle***
2) Write a test program that creates 3 ***Rectangle*** objects:
   Rectangle(), ***Rectangle(4,40)*** and ***Rectangle(3.5,35.9)***
3) Print the width, height, area, and perimeter for each object.
4) Submission File Name: **Q2_TestRectangle.java**

Rectangle	
width: double	The width of this rectangle (default 1).
height: double	The height of this rectangle (default 1).
Rectangle()	Constructs a default rectangle.
Rectangle(width: double, height: double)	Constructs a rectangle with the specified width and height.
getArea(): double	Returns the area of this rectangle.
getPerimeter(): double	Returns the perimeter of this rectangle.

Q3. (15 points)

According to the given UML, design a class named ***Time*** to represent the hour, minute, and second. Satisfy the following requirements.

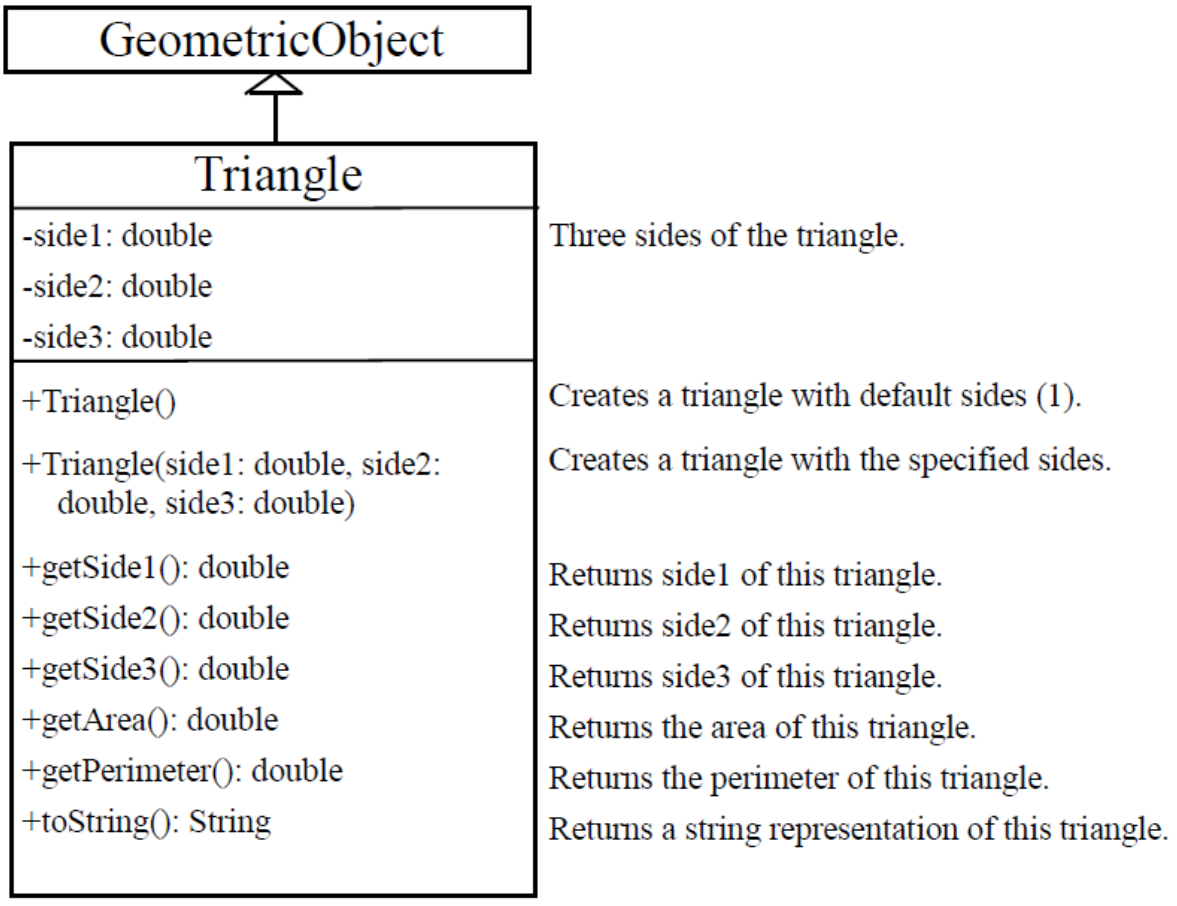
1) Class name: ***Time***
2) Write a test program that creates 3 ***Time*** objects:
   Time(), ***Time(5555500000)***, and ***Time(5, 23, 55)***
3) Print the hour, minute, and second for each object.
4) Submission File Name: **Q3_TestTime.java**

Time	
-hour: int	The hour for the time.
-minute: int	The minute for the time.
-second: int	The second for the time.
+Time()	Constructs Time for the current time.
+Time(elapseTime: long)	Constructs Time with a specified elapse time in milliseconds.
+Time(hour: int, minute: int, second: int)	Constructs Time with the specified hour, minute, and second.
+getHour(): int	Returns the clock hour for the time.
+getMinute(): int	Returns the minute for the time.
+getSecond(): int	Returns the second for the time.
+setTime(elapsedTime: long): void	Sets a time for the specified elapsed time.

Q4. (15 points)

According to the given UML, design a class named ***Triangle*** that extends ***GeometricObject***. Satisfy the following requirements.

1) An abstract class is given: **GeometricObject.java**
2) Write a test program that prompts the user to enter three sides of the triangle, a color, and a Boolean value to indicate whether the triangle is filled.
3) Print the area, perimeter, color, and true or false to indicate whether the triangle is filled or not.
4) Override the ***getArea*** method from **GeometricObject.java**
   Override the ***getPerimeter*** method from **GeometricObject.java**
   Override the ***toString*** method from **GeometricObject.java**
   (**toString** method returns each side of the triangle)
5) Submission File Name: **Q4_TestTriangle.java**



Q5. (15 points)

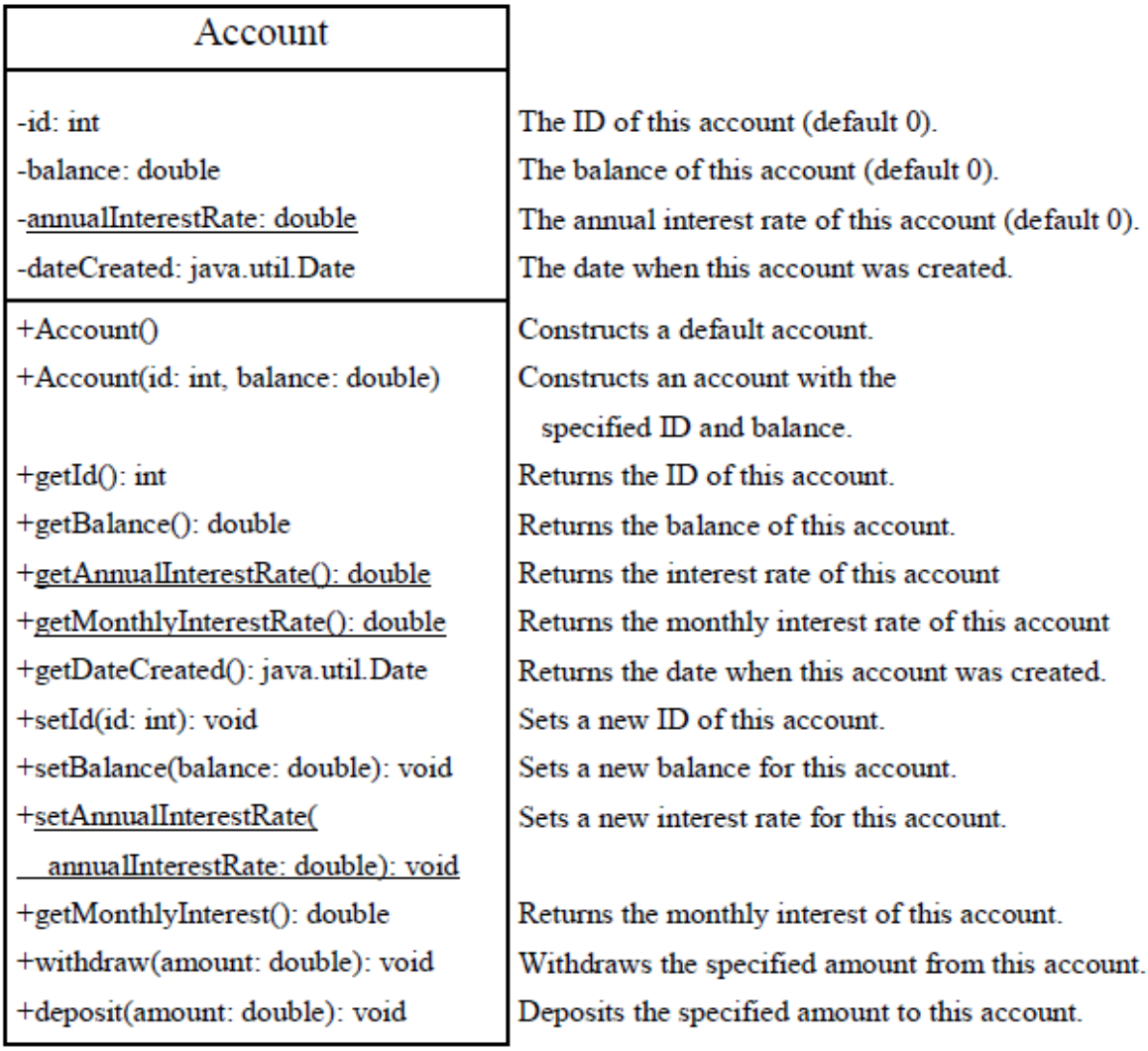
Write a Java program that counts the number of characters, words, and lines in a file (file reading and writing). Words are separated by a space.

1) A text file is given: **Lincoln.txt**
2) Check the file exists. If not, print this message “Source file does not exist” and terminate the program.
3) Use ***Exception***.
4) Use the ***Scanner*** class to read the file.
5) Write a text file (Q5_CountLincoln.txt) that includes the number of characters, words, and lines.
6) Check the file (Q5_CountLincoln.txt) already exists. If so, print this message “New file already exists” and terminate the program.
7) Submission File Names: **Q5_CountLincoln.java** and **Q5_CountLincoln.txt**

Q6. (15 points)

According to the given UML, design a class named ***Account*** to represent the balance, monthly interest, date when an account was created.

1) Class name: ***Account***
2) Write a test program that creates an ***Account*** object with an account ID of 1122, a balance of $20,000, and an annual interest rate of 4.5%.
3) Use the ***withdraw*** method to withdraw $2,500
   Use the ***deposit*** method to deposit $3,000
4) Print the balance, monthly interest, and date when the account was created.
5) Submission File Name: **Q6_TestAccount.java**



Q7. (20 points)

Write a Java program that simulate an ATM machine by using the Account class created in Q6.

1) Create 10 accounts in an array with ID 1,2,3,… 10 and an initial balance of $100.
   The system prompts the user to enter an ID.
   If the ID entered incorrectly, ask the user to enter a correct ID.

2) Once ID is accepted, the main menu is displayed as follows.
   Choice 1 : check the current balance
   Choice 2 : withdraw money
   Choice 3: deposit money
   Choice 4: exit the menu (return to enter an ID)

3) Once you exit, the system will prompt for an ID again.

4) The system will not stop once the system starts.

5) Submission File Name: **Q7_TestATM.java**

Here is a sample run.

```
Enter an ID: 4

Main menu
1: check balance
2: withdraw
3: deposit
4: exit
Enter a choice: 1
The balance is 100.0

Main menu
1: check balance
2: withdraw
3: deposit
4: exit
Enter a choice: 2
Enter an amount to withdraw: 30

Main menu
1: check balance
2: withdraw
3: deposit
4: exit
Enter a choice: 1
The balance is 70.0

Main menu
1: check balance
2: withdraw
3: deposit
4: exit
Enter a choice: 3
Enter an amount to deposit: 10

Main menu
1: check balance
2: withdraw
3: deposit
4: exit
Enter a choice: 1
The balance is 80.0

Main menu
1: check balance
2: withdraw
3: deposit
4: exit
Enter a choice: 4
Enter an ID:
```