UOW COLLEGE AUSTRALIA

Diploma of Information Technology

First name: Click or tap here to enter text.

Family name: Click or tap here to enter text.

Student number: Click or tap here to enter text.

DPIT121 Object Oriented Design & Programming

Final Examination

Spring Session 2023

This exam represents 24% of the total subject marks

Reading time:	5 minutes
Time allowed:	3 hours in addition to reading time
Online submission time:	30 minutes

DIRECTIONS TO STUDENTS

1. During the 30 minutes submission time you can submit all of your files.
2. All questions are to be attempted.
3. Total number of questions: eleven (11)
    - **Part A: Questions 1 to 6** (6 questions) **12 marks**
    - **Part B: Questions 7 to 9** (3 questions) **12 marks**
    - **Part C: Question 10 to 11** (2 questions) **16 marks**

All questions are to be submitted to the links on the subject Moodle site.

Total marks: 40 (24% of the total subject marks)

PART A

1. **(2 marks)** What are two differences between an abstract class and interface in Java?

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2. **(2 marks)** What is the output of the following program?

```
class A {
 void m1(Object obj){
  System.out.println("Pink");
 }
}
class B extends A {
 void m1(Object obj){
  super.m1(null);
  System.out.println("Red");
 }
 void m2(Object obj){
  System.out.println("Blue");
  this.m1(null);
 }
}
public class TestRun{
public static void main(String[] args){
 A a = new B();
 a.m1(new A());

B b = new B();
 b.m2(new B());
  }
}
```

Click or tap here to enter text.

3. **(2 marks)** Identify the error/s in the following program code that would prevent it from running correctly.

```
class A {
 void m1(String xyz){
  System.out.println("One");
 }
}
class B extends A {

}
public class Test{
public static void main(String[] args){
 A a = new B();
 a.m1(new A());
  }
}
```

Click or tap here to enter text.

4. (2 marks) What are the two differences between ArrayList and Vector in Java?

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5. (2 marks) What are the two differences between AWT and Swing in Java?

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6. **(2 marks)** Identify the two classes (A, B, C, D, E, F) in the following program code that is using the Shape class correctly?

```
A. public class Circle implements Shape
   {
    private int radius;
   }
B. public abstract class Circle extends Shape
   {
    private int radius;
   }
C. public class Circle extends Shape
   {
   private int radius;
   public void draw();
   }
D. public abstract class Circle implements Shape
   {
    private int radius;
    public void draw();
   }
E. public class Circle extends Shape
   {
    private int radius;
    public void draw()
    {
     /* additional code here */
    }
   }
F. public abstract class Circle implements Shape
   {
     private int radius;
     public void draw()
     {
      /* additional code here */
     }
   }
```

Click or tap here to enter text.

PART B

7. **(4 marks)** Write a program that includes a user-defined exception class by extending the `exception` class to handle two different scenarios. Scenario one is where the input cannot be negative. Scenario two is where the input cannot be within the range 0 to 45. The program must throw an object of user defined exception `class` and handle it by using a nested `try` block with specific exceptions `catch` block. Please also define the `finally` block in the program code.

REQUIREMENTS

- The program should be designed to get user input via the keyboard.
- The user input is verified and appropriate exception handling is implemented as specified in the question.
- The input of negative numbers should be handled.
- The input of numbers not within the range of 0 to 45(including 0 and 45) should be handled.
- The program should throw an object of user defined exception class and handle it by nested `try` block with a specific exception `catch` block.
- `Finally` block should be included in the program.

Example of the program output:

Example 1

```
Enter a number: -90
Value cannot be negative
Please enter a non negative number
My Exception was thrown and handled: exceptionhandlingproblems.MyException
Exception was thrown and handled:
Continuation of uninterupted program
Program continues smoothly
```

Example 2

Output when scanner input is between 0(inclusive) and 45 (inclusive) is entered

```
Enter a number: 6
Continuation of uninterupted program
Program continues smoothly
```

Example 3

Output, when scanner input is outside the range of 0 (inclusive) and 45 (inclusive), is entered

```
Enter a number: 100
Value cannot be negative
Please enter a value between 0 and 45
My Exception was thrown and handled: exceptionhandlingproblems.MyException
Exception was thrown and handled:
Continuation of uninterupted program
Program continues smoothly
```

Write your answer on the following page

Answer for Question 7:

Click or tap here to enter text.

8. **(4 marks)** Create a java program for accepting the dealer details. The application should accept the dealer details such as name, address, phone number and services offered by the dealer. The dealer detail should be recorded in a file called `dealerdetails.txt`. This program should use a `Serializable` interface. The dealer detail will be hardcoded within the program and will not require user input via keyboard(scanner). The dealer details are shown within the program as shown in the program upon running it.

Program output:

```
Name: John Curtis
Address: 84 Rose Street Springwood NSW 2777
Phone number: 0401566788
Services: Delivery
```

REQUIREMENTS

`Application` class:

- Implements `Serializable`
- It has 4 data fields - `String name; String address; String phoneno; String services;`
- It has one constructor that takes 4 arguments, i.e., `application(String name, String address, String phoneno, String services).`
- It has `print_details()` that prints Name, Address, Phone number and Services on a separate line.

`Dealerdetail` class:

- Inputs the hardcoded dealer details using a constructor `application("John Curtis", "84 Rose Street Springwood NSW 2777 ", "0401566788", "delivery")`
- Write and save the dealer details into text file called `dealerdetails.txt.`
- Use `FileInputStream, FileOutputStream, ObjectOutputStream and ObjectInputStream.`
- Your code must work exactly the same as the specification with the program output as shown and should create a file called `dealerdetails.txt` in the program directory upon running it.

Example of the program output:

```
Name: John Curtis
Address: 84 Rose Street Springwood NSW 2777
Phone number: 0401566788
Services: Delivery
```

Answer for Question 8:

Click or tap here to enter text.

9. **(Total 4 marks – 0.5 marks each for correct multiple choice answer)** Choose the correct answer for each question.

i. Which of the following is true about super class? Choose one.

☐ Variables, methods and constructors which are declared private can be accessed only by the members of the super class.

☐ Variables, methods and constructors which are declared protected can be accessed by any subclass of the super class

☐ Variables, methods and constructors which are declared public in the superclass can be accessed by any class.

☐ All of the above

ii. Which of these classes are the direct subclasses of the Throwable class? Choose one.

☐ Exception and VirtualMachineError class

☐ RuntimeException and Error classa.lang

☐ RuntimeException and Error classva.io

☐ java.system

iii. Which of these data types is used by the operating system to manage the Recursion in Java? Choose one.

☐ Tree

☐ Queue

☐ Stack

☐ Array

iv. Which of these methods of Object class can clone an object? Choose one.

☐ copy()

☐ object copy()

☐ cloning()

☐ Object clone()

v. Which of these access specifiers can be used for an interface? Choose one.

☐ Protected

☐ Public

☐ Private

☐ All of the mentioned

vi. What happens if we put a key object in a HashMap which exists? Choose one.

☐ It throws an exception as the key already exists in the map

☐ The old object is removed from the map

☐ The new object is discarded

☐ The new object replaces the older object

vii. Stream operations in Java 8 can be divided into the following types. Choose one.

☐ Terminal types and Intermediate types

☐ Final and initial types

☐ Static and constant

☐ None

viii. Lambda expressions in Java 8 are based on? Choose one.

☐ Procedural programming

☐ Functional programming

☐ Data programming

☐ All

PART C

10. (Total 8 marks) Write a java program that has a class called `Book` with the attributes `name, author, price, type` (sciencefiction, comedy, thriller). Use input methods to get the input values. Create three arraylists (sciencefiction, comedy and thriller).

- For each type of book, insert/hardcode the book object into the respective arraylist. Add two books each as shown in the example program output for each arraylist (sciencefiction, comedy and thriller). (Hint: no need for scanner input)
- Display the list of books in each type as shown in the output.
- Sort and display the list of books in each list by the book name as shown in the program output.
- Display the minimum and maximum priced books of each list as shown in the program output.

REQUIREMENTS

`Book` class:

- Implements Serializable
- It has 4 data fields - `String name; String author; float price; String type;`
- It has the first constructor that takes 4 arguments, i.e., `Book(String name, String author, float price, String type).`
- It has a second constructor that takes 4 arguments, i.e., `set_values(String name, String author, float price, String type).`
- It has `print_book()` that prints the book name, author, price and type for each book on a separate line as shown in example program output.

`NameComparator` class:

- Implements `Comparator` interface
- Includes a `method` to compare book by `name`

`PriceComparator` class:

- Implements `Comparator` interface
- Includes a `method` to compare books by `price`

`BookArrayList` class:

- Includes three arraylist – one each for sciencefiction, comedy and thriller type
- Hardcode 2 books for each type - sciencefiction, comedy and thriller (6 books in total)
- It has `print_book()` that prints the book name, author, price and type for each book on a separate line as shown in example program output.
- Call `NameComparator()` and `PriceComparator()` for sorting based on name and price
- Include methods to show output as shown in the example program output.

Example of the program output:

```
Books in the sciencefiction list:
Name: Brief History of Time   Author: Stephen Hawking   Price: 43.0   Type: sciencefiction
Name: The Unidentified   Author: Colin Dickey   Price: 53.0   Type: sciencefiction


Books in the comedy list:
Name: Scoop   Author: Evelyn Waugh   Price: 45.0   Type: comedy
Name: My Lifey   Author: Paddy McGuinness   Price: 29.0   Type: comedy


Books in the thriller list:
Name: Wild Place   Author: Christian White   Price: 47.0   Type: thriller
Name: The Guest List   Author: Lucy Foley   Price: 23.0   Type: thriller


Sorting sciencefiction list based on names:
        Brief History of Time
        The Unidentified

Sorting comedy list based on names:
        My Lifey
        Scoop

Sorting thriller list based on names:
        The Guest List
        Wild Place

Sorting sciencefiction list based on prices:
        Minimum Price: 43.0
        Maximum Price: 53.0

Sorting comedy list based on prices:
        Minimum Price: 29.0
        Maximum Price: 45.0

Sorting thriller list based on prices:
        Minimum Price: 23.0
        Maximum Price: 47.0
```

Write your answer on the following page

Answer for Question 10:

Click or tap here to enter text.

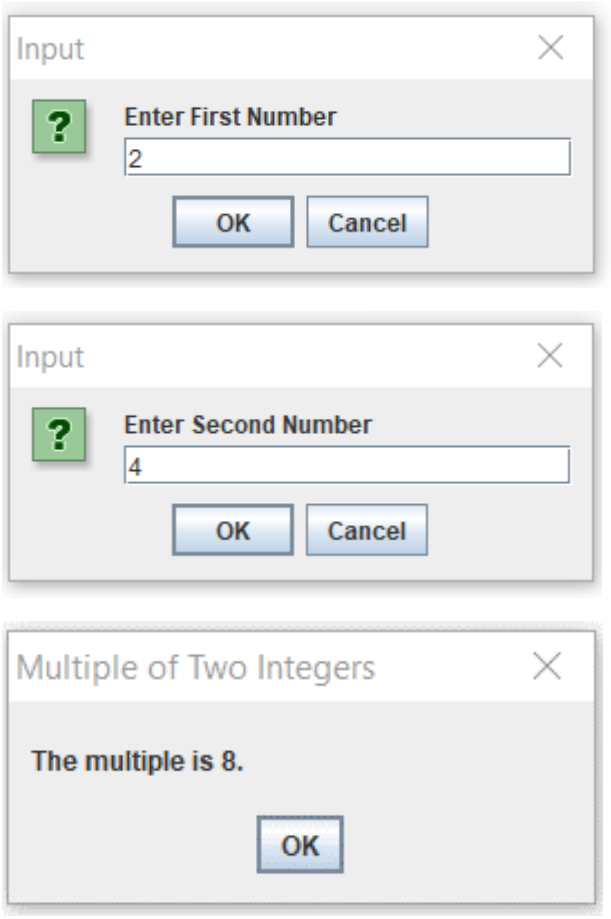
11. (Total 8 marks – 4 marks each for 11a and 11b) There are two questions within this question.

a) (**4 marks)** Create a java program that uses GUI and uses two input dialogs to obtain integers from the user and a message dialog to display the multiple of the integers the user enters. The program should use `JOptionPane (package javax.swing)` to provide prebuilt dialog boxes for input and output.

REQUIREMENTS

- The program should import `javax.swing.JoptionPane`.
- `JOptionPane` dialog boxes should be used for the input of both numbers and for showing the output for the multiple of both numbers.

Example of the program output:



Write your answer on the following page

Answer for Question 11a:

Click or tap here to enter text.

b) **(4 marks)** Create a java program that uses Cloneable Interface to generate an exact copy of the `object` with a different name. The program should clone the object `obj1` into the object `obj2`. After cloning you should get the same cat name in object `obj2`, which you have set in the object `obj1`.

REQUIREMENTS

- Class `CatName` implements `Cloneable`
- Class `CatName` overrides `clone()` method of Object class.
- During `clone()` method call, it should handle `CloneNotSupportedException` using `try catch` block.

Example of the program output:

```
Lucy
```

Write your answer on this page

Answer for Question 11b:

Click or tap here to enter text.