WIX1002 Fundamentals of Programming
Lab Report 3

1. MapleStory is an awesome side-scrolling MMORPG where fascinating lore and epic adventures unravel. You will play the role of the greatest king of thieves **Phantom**, who courageously sealed the almighty Black Mage, a powerful being possessing a different ideology with us so we must unreasonably define him as the villain.

   The **Phantom** class will have such *properties and* behaviours:

   - An empty constructor initializing **Phantom's**:
     - *accuracy* as 1.00   [0.00 < *accuracy* < 1.00]
     - *critRate* as 1.00   [0.00 < *critRate* < 1.00]

   - A constructor requiring two parameters to initialize Phantom's private properties, *accuracy* and *critRate*.

   - Accessor and mutator methods for both variables with the limit restrictions imposed.

   - A **BlackMage** class with the default access modifier.

   - An empty constructor defaulting to 100 *hp*, 5% *evasion* and 10% *critResistance*.

   - The legendary thief **Phantom** is skillful in delivering powerful consecutive blows to the target's weaknesses. Program a int damage(BlackMage blackMage) method which:

     - Evaluates the total effective *accuracy* via multiplication of *accuracy* and *evasion*.
     - Evaluates the total effective *critRate* via subtraction of *critResistance* from *critRate*.
     - Returns a damage value of either:
       - Critical hit: 4 points
       - Normal hit: 2 points
       - Missed hit: 0 point

   - A toString method that returns a combat log as shown in the sample output.

Sample output

```
The epic battle begins!
[NORM] Phantom has dealt 2 damage to the Black Mage (98/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (96/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (94/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (92/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (90/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (88/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (86/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (84/100)
[MISS] Phantom has dealt 0 damage to the Black Mage (84/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (82/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (80/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (78/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (76/100)
```

…

```
[NORM] Phantom has dealt 2 damage to the Black Mage (24/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (22/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (20/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (18/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (16/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (14/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (12/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (10/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (8/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (6/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (4/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (2/100)
[NORM] Phantom has dealt 2 damage to the Black Mage (0/100)
The Black Mage is defeated...
------------------------------------------------------------
BUILD SUCCESS
------------------------------------------------------------
Total time:  0.887 s
```

2. In the enchanting world of wizards and magic, within the hallowed halls of Hogwarts, you are entrusted with a mission of utmost importance - to design a sophisticated library system. This system will serve as the guardian of knowledge, facilitating the organization of countless magical tomes, and helping both students and professors find the books they seek.

   You are hereby tasked with creating a class `Book`, a magical repository that houses essential information about each spellbinding book. These details include the book's title, author, and an enchanted ISBN. Your expertise will be needed to conjure the necessary constructor, accessor, and mutator spells for each variable, as required.

   You'll also need to create another class called `Library`. In this class, you'll enable students and professors to search for books by their title or author's name. The `Library` should also allow users to add or remove books from its collection. There's a special rule in this library – books with ISBN numbers ending in prime digits for the last two digits won't be available for borrowing. Additionally, you should include another method which is sort the books within the library's collection based on their book title in ascending order.

   Now, with this library system, your mission is to craft these classes and methods, allowing the library to fulfill its role in the magical world of Hogwarts.

Test Program

```java
public class HogwartsLibraryTest {
    public static void main(String[] args) {
        Library hogwartsLibrary = new Library();

        Book book1 = new Book("The Standard Book of Spells",
"Miranda Goshawk", "9452297");
        Book book2 = new Book("Advanced Potion-Making",
"Libatius Borage", "4826972");
        Book book3 = new Book("Fantastic Beasts and Where to
Find Them", "Newt Scamander", "1564815");
        Book book4 = new Book("The Dark Forces: A Guide to
Self-Protection", "Quirinus Quirrell", "1891568");
        Book book5 = new Book("Forbidden Spells", "Salazar
Slytherin", "7134567"); // ISBN ends in prime digits

        hogwartsLibrary.addBook(book1);
        hogwartsLibrary.addBook(book2);
        hogwartsLibrary.addBook(book3);
        hogwartsLibrary.addBook(book4);
        hogwartsLibrary.addBook(book5);

        System.out.println("Searching for books by author:");
        hogwartsLibrary.findBooksByAuthor("Miranda Goshawk");

        System.out.println("\nSearching for books by title:");
        hogwartsLibrary.findBooksByTitle("The Standard Book of
Spells");

        boolean canBorrow =
hogwartsLibrary.borrowBook("9452297");
        if (canBorrow) {
            System.out.println("\nYou've borrowed a book!");
        } else {
            System.println("\nSorry, this book is not available
for borrowing.");
        }

        System.out.println("\nSorted Books:");
        hogwartsLibrary.sortBooks();

        hogwartsLibrary.removeBook("1564815"); // Fantastic
Beasts and Where to Find Them
```

```
            System.out.println("\nUpdated Library:");
            hogwartsLibrary.displayLibrary();
    }
}
```

Sample Output

```
Searching for books by author:
Books by author 'Miranda Goshawk':
- Title: The Standard Book of Spells
  Author: Miranda Goshawk
  ISBN: 9452297

Searching for books by title:
Books with title 'The Standard Book of Spells':
- Title: The Standard Book of Spells
  Author: Miranda Goshawk
  ISBN: 9452297

You've borrowed a book!

Sorted Books:
Books in the library, sorted by title:
- Title: Advanced Potion-Making
  Author: Libatius Borage
  ISBN: 4826972

- Title: Fantastic Beasts and Where to Find Them
  Author: Newt Scamander
  ISBN: 1564815

- Title: The Dark Forces: A Guide to Self-Protection
  Author: Quirinus Quirrell
  ISBN: 1891568

- Title: The Standard Book of Spells
  Author: Miranda Goshawk
  ISBN: 9452297

Updated Library:
Books in the library, sorted by title:
- Title: Advanced Potion-Making
  Author: Libatius Borage
  ISBN: 4826972
```

```
- Title: The Dark Forces: A Guide to Self-Protection
  Author: Quirinus Quirrell
  ISBN: 1891568

- Title: The Standard Book of Spells
  Author: Miranda Goshawk
  ISBN: 9452297
```

Lab Report

Prepare a report to solve the above problems. The report should contain all the sections as below for each question:

No	Section	Description
1	Problem	Description on the problem
2	Solution	Explanation on how to solve the above problems
3	Sample Input & Output	A few sets of input and output (snapshot)
4	Source Code	Java Source Code

Requirements

1. Group Assignment (4-5 students per group)
2. Cover page that includes all student matric number and full name.
3. Font: Times New Roman 12, Line Spacing: 1 ½ Spacing
4. Submit to Spectrum according to your OCC.