COMP 131 Midterm Exam II, Practice Exam (100 points total)

name: _____

Question 1 (15 points). Consider the following class definitions (JavaDoc comments have been eliminated to save space):

```
public class Book {
	private String title; // the book's title
	private int numPages; // the number of pages in the book

	public Book(String title, int numPages) {
		this.title = title;
		this.numPages = numPages;
	}

	public String getTitle() {
		return title;
	}

	public int getNumPages() {
		return numPages;
	}
}

import java.util.ArrayList;

public class Library {
	private String town; // the name of the town
	                     // where this library is located
	private ArrayList<Book> books; // list of all books
	                               // contained in the library

	public Library(String town) {
		this.town = town;
		books = new ArrayList<Book>();
	}

	public void addBook(Book book) {
		books.add(book);
	}

	public void removeBook(int index) {
		books.remove(index);
	}
}
```

Draw an object diagram for the object referred to by the variable `myLibrary` after the following snippet of code has been executed.

(Question 1 continued)

```
Library myLibrary = new Library("Carlisle");
Book greatExpectations =
     new Book("Great Expectations", 577);
Book prideAndPrejudice =
     new Book("Pride and Prejudice", 322);
Book catInHat = new Book("The Cat in the Hat", 18);
Book websters = new Book("Webster's Dictionary", 759);

myLibrary.addBook(greatExpectations);
myLibrary.addBook(prideAndPrejudice);
myLibrary.addBook(catInHat);
myLibrary.addBook(websters);
myLibrary.removeBook(3);
myLibrary.removeBook(1);
```

Question 2 (10 points). Rewrite the `removeBook` method so that it prints an appropriate error message if the formal parameter `index` is too large or too small, but still removes the correct book if `index` is valid.

Question 3 (15 points). Write a method for the `Library` class with the signature `public Book getLongestBook()`, which returns the longest book in the library (i.e. the one with the most pages). If there is a tie for the longest book, the method may return any one of the longest books.

Question 4 (10 points). Write a method for the `Library` class with the signature `public void printLongestBook()`, which prints out the title of the longest book in the library. Hint: for maximum credit, do not repeat or rewrite any code you have written already in the previous questions.

Question 5 (15 points). Write a method for the `Library` class with the signature `public Library getBooksOver500()`, which returns a new library containing all books in the original library with 500 or more pages.

Question 6 (5 points). Write a snippet of Java code that creates a local variable named `greatGatsby`, and stores in that variable a reference to a new `Book` object representing a 233-page book whose title is "The Great Gatsby".

Question 7 (8 points). Fill in the two missing Boolean expressions in the if statements of the following method of the Book class.

```
/**
 * Return true if book2 has the same title and
 * number of pages as the calling object,
 * otherwise return false.
 */
public boolean equals(Book book2) {
      String title1 = this.getTitle();
      String title2 = book2.getTitle();
      int numPages1 = this.getNumPages();
      int numPages2 = book2.getNumPages();

      //  first test whether the two titles are the same

      if (_____________________________________________) {

            // next test if numbers of pages are the same

            if (_____________________________________________) {

                  return true;
            } else {
                  return false;
            }
      } else {
            return false;
      }
}
```

Question 8 (10 points). One definition of *composition* is "using objects as fields in other objects". Write 3-4 sentences explaining the advantages of using composition in software projects.

Question 9 (6 points). What output would be produced by the following snippet of code?

```
int value = 29;
while (value >= 14) {
      System.out.println(value);
      value = value - 5;
}
```

Question 10 (6 points). What output would be produced by the following snippet of code?

```
for (int i = 5; i < 25; i = 2 * i) {
      int j = i - 3;
      System.out.println(j);
}
```