1 Quik Maths

(a) Fill in the blanks in the main method below. (Fall ’16, MT1)

```java
public class QuikMaths {
    public static void multiplyBy3(int[] A) {
        for (int i = 0; i < A.length; i += 1) {
            int x = A[i];
            x = x * 3;
        }
    }

    public static void multiplyBy2(int[] A) {
        int[] B = A;
        for (int i = 0; i < B.length; i+= 1) {
            B[i] *= 2;
        }
    }

    public static void swap(int A, int B) {
        int temp = B;
        B = A;
        A = temp;
    }

    public static void main(String[] args) {
        int[] arr = new int[]{2, 3, 3, 4};
        multiplyBy3(arr); // Value of arr: {________________________}

        arr = new int[]{2, 3, 3, 4};
        multiplyBy2(arr); // Value of arr: {________________________}

        int a = 6;
        int b = 7;
        swap(a, b); // Value of a: _____ Value of b: ______
    }
}
```
(b) Now take a look at the code below. How could we write ‘swap’ to perform swapping primitive variables in a function? Be sure to use the IntWrapper class below.

```java
class IntWrapper {
    int x;
    public IntWrapper(int value) {
        x = value;
    }
}

public class SwapPrimitives {
    public static void main(String[] args) {
        int a = 6;
        int b = 7;

        swap(__________, __________);

        a = ___________________________________;  // a should be 7
        b = ___________________________________;  // b should be 6
    }

    public static void swap(_________________, _________________) {
        ___________________________________;  // x1 should be a
        ___________________________________;  // x2 should be b
        ___________________________________;  // b should be a
        ___________________________________;  // a should be b
    }
}
```
2 Static Books

Suppose we have the following Book and Library classes.

class Book {
    public String title;
    public Library library;
    public static Book last = null;

    public Book(String name) {
        title = name;
        last = this;
        library = null;
    }

    public static String lastBookTitle() {
        return last.title;
    }

    public String getTitle() {
        return title;
    }
}

class Library {
    public Book[] books;
    public int index;
    public static int totalBooks = 0;

    public Library(int size) {
        books = new Book[size];
        index = 0;
    }

    public void addBook(Book book) {
        books[index] = book;
        index++;
        totalBooks++;
        book.library = this;
    }
}

(a) For each modification below, determine whether the code of the Library and Book classes will compile or error if we only made that modification, i.e. treat each modification independently.

1. Change the totalBooks variable to non static
2. Change the lastBookTitle method to non static
3. Change the addBook method to static
4. Change the last variable to non static
5. Change the library variable to static
(b) Using the original Book and Library classes (i.e., without the modifications from part a), write the output of the main method below. If a line errors, put the precise reason it errors and continue execution.

```java
public class Main {
    public static void main(String[] args) {
        System.out.println(Library.totalBooks); _____________________
        System.out.println(Book.lastBookTitle()); _____________________
        System.out.println(Book.getTitle()); _____________________

        Book goneGirl = new Book("Gone Girl");
        Book fightClub = new Book("Fight Club");

        System.out.println(goneGirl.title); _____________________
        System.out.println(Book.lastBookTitle()); _____________________
        System.out.println(fightClub.lastBookTitle()); _____________________
        System.out.println(goneGirl.last.title); _____________________

        Library libraryA = new Library(1);
        Library libraryB = new Library(2);
        libraryA.addBook(goneGirl);

        System.out.println(libraryA.index); _____________________
        System.out.println(libraryA.totalBooks); _____________________

        libraryA.totalBooks = 0;
        libraryB.addBook(fightClub);
        libraryB.addBook(goneGirl);

        System.out.println(libraryB.index); _____________________
        System.out.println(Library.totalBooks); _____________________
        System.out.println(goneGirl.library.books[0].title); _____________________
    }
}
```