1 Give em the 'Ol Switcheroo

For each function call in the main method, write out the x and y values of both foobar and baz after executing that line. (Spring '15, MT1)

```java
public class Foo {
    public int x, y;

    public Foo (int x, int y) {
        this.x = x;
        this.y = y;
    }
    public static void switcheroo (Foo a, Foo b) {
        Foo temp = a;
        a = b;
        b = temp;
    }
    public static void fliperoo (Foo a, Foo b) {
        Foo temp = new Foo(a.x, a.y);
        a.x = b.x;
        a.y = b.y;
        b.x = temp.x;
        b.y = temp.y;
    }
    public static void swaperoo (Foo a, Foo b) {
        Foo temp = a;
        a.x = b.x;
        a.y = b.y;
        b.x = temp.x;
        b.y = temp.y;
    }

    public static void main (String[] args) {
        Foo foobar = new Foo(10, 20);
        Foo baz = new Foo(30, 40);
        switcheroo(foobar, baz);    foobar.x: ___ foobar.y: ___ baz.x: ___ baz.y: ___
        fliperoo(foobar, baz);      foobar.x: ___ foobar.y: ___ baz.x: ___ baz.y: ___
        swaperoo(foobar, baz);      foobar.x: ___ foobar.y: ___ baz.x: ___ baz.y: ___
    }
}
```

2   Quik Maths

What would the contents of the array be after being run through these functions in the `main` method? (Fall '16, MT1)

```java
public class QuikMaths {
    public static void mulitplyBy3(int[] A) {
        for (int x: A) {
            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;
        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: _____ */
    }
}
```

3 Static Books

Suppose we have the following Book and Library classes.

```java
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;
    }
}
```

```java
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 Book and Library classes from before, write the output of the main
method below. If a line errors, put the precise reason it errors and continue
execution.

```
1  public class Main {
2      public static void main(String[] args) {
3          System.out.println(Library.totalBooks);              _____
4          System.out.println(Book.lastBookTitle());            _____
5          System.out.println(Book.getTitle());                 _____
6
7          Book goneGirl = new Book("Gone Girl");
8          Book fightClub = new Book("Fight Club");
9
10         System.out.println(goneGirl.title);                  _____
11         System.out.println(Book.lastBookTitle());            _____
12         System.out.println(fightClub.lastBookTitle());       _____
13         System.out.println(goneGirl.last.title);             _____
14
15         Library libraryA = new Library(1);
16         Library libraryB = new Library(2);
17         libraryA.addBook(goneGirl);
18
19         System.out.println(libraryA.index);                  _____
20         System.out.println(libraryA.totalBooks);             _____
21
22         libraryA.totalBooks = 0;
23         libraryB.addBook(fightClub);
24         libraryB.addBook(goneGirl);
25
26         System.out.println(libraryB.index);                  _____
27         System.out.println(Library.totalBooks);              _____
28         System.out.println(goneGirl.library.books[0].title); _____
29     }
30 }
```