1   Static Shock

Write what the `main` method will print out once it is executed. It might be helpful to draw box and pointer diagrams to keep track of variables. (Spring '15, MT1)

```java
public class Shock {
    public static int bang;
    public static Shock baby;
    public Shock() {
        this.bang = 100;
    }
    public Shock (int num) {
        this.bang = num;
        baby = starter();
        this.bang += num;
    }
    public static Shock starter() {
        Shock gear = new Shock();
        return gear;
    }
    public static void shrink(Shock statik) {
        statik.bang -= 1;
    }
    public static void main(String[] args) {
        Shock gear = new Shock(200);
        System.out.println(gear.bang);          _____ //300
        shrink(gear);
        shrink(starter());
        System.out.println(gear.bang);          _____ //99
    }
}
```

Note that all the variables (bang and baby) are static, so we only need to track what their current values are to answer this question. We really only need to keep track of changes to bang.

2   Horse-o-Scope

Given the following program, draw out the box and pointer diagram that results from executing the `main` method. What is the output printed by the program? (Summer '16, MT1)

```
1   public class Horse {
2       Horse same;
3       String jimmy;
4
5       public Horse(String lee) {
6           jimmy = lee;
7       }
8
9       public Horse same(Horse horse) {
10          if (same != null) {
11              Horse same = horse;
12              same.same = horse;
13              same = horse.same;
14          }
15          return same.same;
16      }
17
18      public static void main(String[] args) {
19          Horse horse = new Horse("youve been");
20          Horse cult = new Horse("horsed");
21          cult.same = cult;
22          cult = cult.same(horse);
23          System.out.println(cult.jimmy);
24          System.out.println(horse.jimmy);
25      }
26  }
```

Program Output:
horsed
you've been
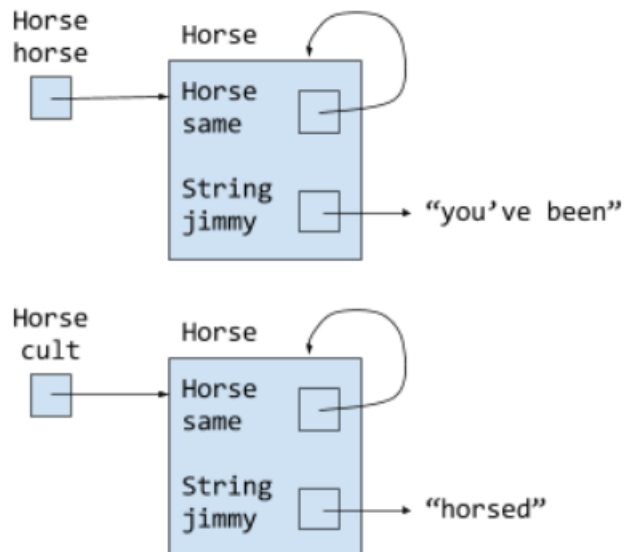
3   Give em the 'Ol Switcheroo

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: 10 foobar.y: 20 baz.x: 30 baz.y: 40
        fliperoo(foobar, baz);      foobar.x: 30 foobar.y: 40 baz.x: 10 baz.y: 20
        swaperoo(foobar, baz);      foobar.x: 10 foobar.y: 20 baz.x: 10 baz.y: 20
    }
}
```

4   Quik Maths

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

```
1   public class QuikMaths {
2       public static void mulitplyBy3(int[] A) {
3           for (int x: A) {            it traverses every
4               x = x * 3;              element in A(int)
5           }
6       }                          directly change the int will have
7                                  no effect to the original array
8       public static void multiplyBy2(int[] A) {
9           int[] B = A;
10          for (int i = 0; i < B.length; i+= 1) {
11              B[i] *= 2;
12          }
13      }
14
15      public static void swap (int A, int B ) {
16          int temp = B;
17          B = A;
18          A = temp;           no effect
19      }
20
21      public static void main(String[] args) {
22          int[] arr;
23          arr = new int[]{2, 3, 3, 4};
24          multiplyBy3(arr);
25
26          /* Value of arr: {2, 3, 3, 4} */
27
28          arr = new int[]{2, 3, 3, 4};
29          multiplyBy2(arr);
30
31          /* Value of arr: {4, 6, 6, 8} */
32
33          int a = 6;
34          int b = 7;
35          swap(a, b);
36
37          /* Value of a: 6   Value of b: 7 */
38      }
39  }
```