

## 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)

```
1 public class Shock {  
2     public static int bang;  
3     public static Shock baby;  
4     public Shock() {  
5         this.bang = 100;  
6     }  
7     public Shock (int num) {  
8         this.bang = num;  
9         baby = starter();  
10        this.bang += num;  
11    }  
12    public static Shock starter() {  
13        Shock gear = new Shock();  
14        return gear;  
15    }  
16    public static void shrink(Shock statik) {  
17        statik.bang -= 1;  
18    }  
19    public static void main(String[] args) {  
20        Shock gear = new Shock(200);  
21        System.out.println(gear.bang);           ----- //300  
22        shrink(gear);  
23        shrink(starter());  
24        System.out.println(gear.bang);           ----- //99  
25    }  
26 }
```

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)

```

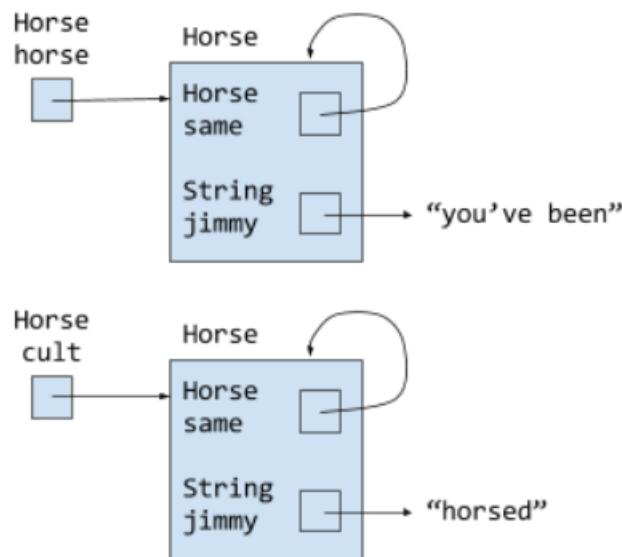
1  public class Horse {
2      Horse same;
3      String jimmy;
4
5      public Horse(String lee) {
6          jimmy = lee;
7      }
8
9      public Horse same(Horse horse) {
10         if (same != null) {
11             Horse same = horse;
12             same.same = horse;
13             same = horse.same;
14         }
15         return same.same;
16     }
17
18     public static void main(String[] args) {
19         Horse horse = new Horse("you've 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

### NOTE:

This question (Horse-o-Scope) and variable shadowing in general (defining local variables with the same name as instance variables) is not in the scope of Spring 2019.

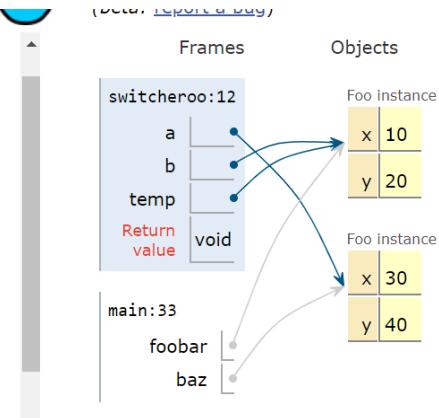


### 3 Give em the 'Ol Switcheroo

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)

```

1  public class Foo {
2      public int x, y;
3
4      public Foo (int x, int y) {
5          this.x = x;
6          this.y = y;
7      }
8
9      public static void swiperoo (Foo a, Foo b) {
10         Foo temp = a;
11         a = b;
12         b = temp;
13     }
14     public static void fliperoo (Foo a, Foo b) {
15         Foo temp = new Foo(a.x, a.y);
16         a.x = b.x;
17         a.y = b.y;
18         b.x = temp.x;
19         b.y = temp.y;
20     }
21
22     public static void swaperoo (Foo a, Foo b) {
23         Foo temp = a;
24         a.x = b.x;
25         a.y = b.y;
26         b.x = temp.x;
27         b.y = temp.y;
28     }
29
30     public static void main (String[] args) {
31         Foo foobar = new Foo(10, 20);
32         Foo baz = new Foo(30, 40);
33         switcheroo(foobar, baz);
34         fliperoo(foobar, baz);
35         swaperoo(foobar, baz);
36     }
37 }
38 }
```



**AS IS**

記得 `a`, `b` 內參數的畫法(也是 pass-by-value)(抄到 `foobar` 和 `baz` 的地址)

改到的是 method 裡面 local 的 `a` 和 `b`,  
沒有改戴 `foobar` 和 `baz`

foobar.x: 10 foobar.y: 20 baz.x: 30 baz.y: 40  
foobar.x: 30 foobar.y: 40 baz.x: 10 baz.y: 20  
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) {
4              x = x * 3;
5          }
6      }
7
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;
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 }
```

