CS 61B Spring 2018

Scope, Pass-by-Value, Static

Exam Prep 1: January 22, 2018

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

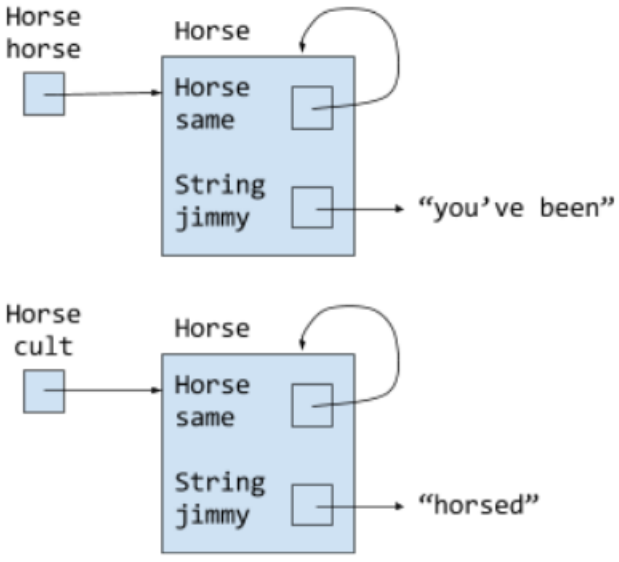
Given the following program, draw out the box and pointer diagram that results from executing the `main` method. What is the output printed by the program? (Summer '16, MT1)

```
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("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)

```
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 switcheroo (Foo a, Foo b) {
10         Foo temp = a;
11         a = b;                                  没引用，都不变
12         b = temp;
13     }
14
15     public static void fliperoo (Foo a, Foo b) {
16         Foo temp = new Foo(a.x, a.y);
17         a.x = b.x;
18         a.y = b.y;                  引用了，会变；temp新建的，没问题，b也能变
19         b.x = temp.x;
20         b.y = temp.y;
21     }
22
23     public static void swaperoo (Foo a, Foo b) {
24         Foo temp = a;
25         a.x = b.x;
26         a.y = b.y;                          a没问题，但temp跟着变，故b不变
27         b.x = temp.x;
28         b.y = temp.y;
29     }
30
31     public static void main (String[] args) {
32         Foo foobar = new Foo(10, 20);
33         Foo baz = new Foo(30, 40);
34         switcheroo(foobar, baz);    foobar.x: 10 foobar.y: 20 baz.x: 30 baz.y: 40
35         fliperoo(foobar, baz);      foobar.x: 30 foobar.y: 40 baz.x: 10 baz.y: 20
36         swaperoo(foobar, baz);      foobar.x: 10 foobar.y: 20 baz.x: 10 baz.y: 20
37     }
38 }
```

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 }
```

对数组A里面的数值做处理不会影响A本身，没引用

相当于引用，A本身会跟着变化

数值不算引用，本身不变