

Welcome to CS108

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main not run

```
public class Hello{  
  
    public static void main (String[ ] args) {  
        System.out.println("Hello");  
    }  
  
}
```

main not run

```
public class Echo {  
  
    public static void main (String[ ] args) {  
        for (String s: args) {  
            System.out.println(s);  
        }  
    }  
}
```

C++ Call-by-Reference vs. Call-by-Value

```
void incrementOne(int& a) {  
    a++;  
}
```

```
void incrementTwo(int a) {  
    a++;  
}
```

C++ Call-by-Reference vs. Call-by-Value

```
void incrementOne(int& a) {  
    a++;  
}
```

```
void incrementTwo(int a) {  
    a++;  
}
```

```
int x = 1;  
incrementOne(x);
```

Vs.

```
int x = 1;  
incrementTwo(x);
```

Java Call-By-Value with Primitive

```
public class CallByValueExample {  
  
    public static void increment(int a) {  
        a++;  
    }  
  
    public static void main(String[] args) {  
        int x = 1;  
  
        increment(x);  
        System.out.println(x);  
    }  
}
```

Java Call-By-Value with Reference Type

```
public class CallByValueExample2 {  
  
    public static void increment(Point a) {  
        a.x++;  
        a.y++;  
    }  
  
    public static void main(String[] args) {  
        Point p = new Point(1,1);  
  
        increment(p);  
        System.out.println("x=" + p.x + ";y=" + p.y);  
    }  
}
```

What does this do?

```
public class CallByValueChange {  
  
    public static void change(Point a) {  
        a = new Point(5,5);  
    }  
  
    public static void main(String[] args) {  
        Point p = new Point(1,1);  
  
        change(p);  
        System.out.println("x=" + p.x + ";y=" + p.y);  
    }  
}
```

Copying Objects

```
Foo x = new Foo(1);
```

```
Foo y = new Foo(2);
```

```
x = y;
```

What got copied?

Copy Constructors

```
Foo x = new Foo(1);
```

```
Foo y = new Foo(x);
```

Not the same as

```
x = y;
```

MyPoint Example

```
public class MyPoint {  
    public int x;  
    public int y;  
  
    MyPoint(int x,int y) {  
        this.x = x;  
        this.y = y;  
    }  
}
```

Copying MyPoint

```
MyPoint p1 = new MyPoint(5,5);
```

```
MyPoint p2 = p1;
```

```
p2.x = 15;
```

What is the value of p1.x and p1.y now?

MyPoint Copy Constructor

```
public class MyPoint {  
    ...  
  
    MyPoint(MyPoint p) {  
        this.x = p.x;  
        this.y = p.y;  
    }  
}
```

Copying MyPoint

```
MyPoint q1 = new MyPoint(5,5);
```

```
MyPoint q2 = new MyPoint(q1);
```

```
q2.x = 15;
```

What is the value of q1.x and q1.y now?

Comparing

```
MyPoint p1 = new MyPoint(5,5);  
MyPoint p2 = p1;
```

Does `p1 == p2`?

```
MyPoint q1 = new MyPoint(5,5);  
MyPoint q2 = new MyPoint(q1);
```

Does `q1 == q2`?

Writing an Equals Method

```
public class MyPoint {  
    ...  
    public boolean equals(MyPoint p) {  
        return (x == p.x) && (y == p.y);  
    }  
}
```

```
MyPoint q1 = new MyPoint(5,5);  
MyPoint q2 = new MyPoint(q1);
```

Does what is `q1.equals(q2)`?

* Depending on your planned use, you may want to write a more general version that takes an `Object` as a parameter not a `MyPoint`.

String Comparison

```
String s1 = new String("Stanford");  
String s2 = new String("Stanford");
```

Does `s1 == s2`?

Does `s1.equals(s2)`?

Multi-Dimensional Array

```
String[][] cartoons =  
    {"Homer", "Marge", "Bart", "Lisa", "Maggie"},  
    {"Peter", "Lois", "Meg", "Chris", "Stewie", "Brian"},  
    {"Cartman", "Kenny", "Stan", "Kyle"}};
```

* Inspired by official Sun Java Example