CSE 121 Lesson 12:
More Arrays, Reference Semantics

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Reminders & Announcements

• C2* (the old C3) was released on Wednesday, due next Tuesday
• R5 released yesterday, due next Thursday (8/8)
• Quiz 2 next Thursday in section
  • topics: everything up until Arrays on Wednesday (i.e. not today’s material)
  • Quiz 1 grades will be released on Monday
• In the future: Final Exam (Friday, 8/16 in lecture)
  • more logistical details coming soon!
• Final Reflection Assignment due 8/16 @ 11:59 pm
(PCM) Value Semantics vs. Reference Semantics

- Applies when working with primitive types
  - Variables/parameters hold a *copy* of the actual value

- Applies when working with objects
  - Variables/parameters hold a *reference* to the object

```java
age = 10;

10

name: age (int)
```

```java
int[] arr = new int[4];

0 0 0 0

name: arr (int[])
```
Value Semantics vs. Reference Semantics

```java
int a = 3;
int b = a;
a = 99;

int[] list1 = {4, 8, 15, 16, 23};
int[] list2 = list1;
list1[1] = 99;
```

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Reference Semantics are a walk in the park!
(PCM) Value Semantics vs. Reference Semantics

```java
boolean test = true;
flipValue(test);
public static void flipValue(boolean b) {
    b = !b;
}
```

```java
boolean[] tests = {
    true, true, false, true, false, false
};
flipValues(tests);
public static void flipValues(boolean[] b) {
    for (int i = 0; i < b.length; i++) {
        b[i] = !b[i];
    }
}
```

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(PCM) null

The absence of a reference!
Sort of like a "zero-equivalent" for references!
Default value for “object types” (e.g. Random, Turtle, Scanner...)

NullPointerExceptions are an error that happen when you ask null to “do something”
• call .toUpperCase() on null? NullPointerException!
• get .nextInt() from null? NullPointerException!
• many, many more
(PCM) avoiding NullPointerException

```java
if (strs[i] != null) {
    System.out.println(strs[i].toUpperCase());
} else {
    System.out.println("element "+i+" is null.");
}
```