

Lecture Set #9: Review of Aliasing & Mutability, Floating Point Calculation Issues

1. Floating Point calculation Issues
2. Aliasing and Mutability
3. Example class development:
Password



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Floating Point Calculations

What will this print?

```
public class SimpleMath {  
    public static void main(String[] args) {  
        if (3.9 - 3.8 == 0.1) {  
            System.out.println("I am a very smart computer.");  
        } else {  
            System.out.println("I can't do simple arithmetic.");  
        }  
    }  
}
```

- I can't do simple arithmetic.
- Why?
- Conversion of floating point to binary leads to precision errors!
- What can we do?

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Floating Point Calculations (cont.)



Two important rules:

- You can never use `==` to compare floating point values. Instead, check if two numbers are within a certain tolerance of each other.
- Never use floating point values to represent money, e.g., 3.52 to represent \$3.52. Instead, use integer 352 to represent 352 pennies.

Taking Care of Corner Cases



- FancyWord example from CVS
 - String of "" was a corner case that we needed to test for
 - Write new test cases or new asserts in the test cases that already exist to take care of this
- What about null references as corner cases?

```
public void testNullAndEmpty() {  
    FancyWord a = new FancyWord(null);  
    assertEquals(null, a.toString());  
    FancyWord b = new FancyWord("");  
    assertEquals("", b.toString());  
}
```

What about Strings and Aliasing?

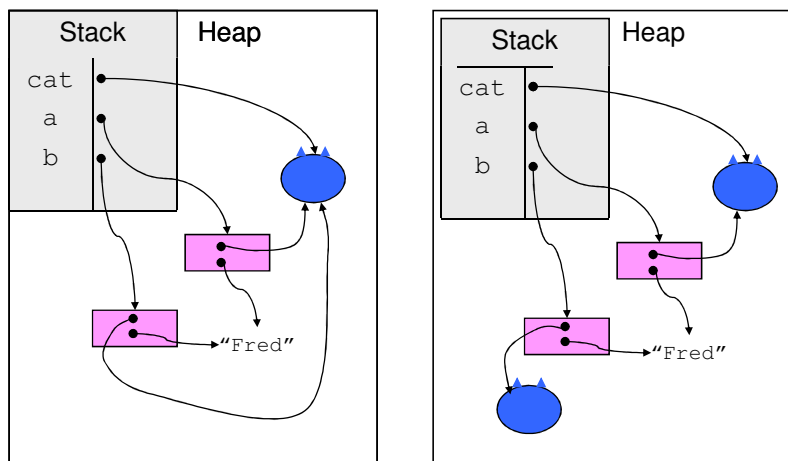


- `String` objects are *immutable*; fields cannot be changed once created
 - **Mutable** objects: fields (values of instance variables) can be changed (e.g. `Cat`, `Student`, etc.)
 - **Immutable** objects: fields (values of instance variables) cannot be changed
 - See `String` API: <http://java.sun.com/j2se/1.3/docs/api/java/lang/package-summary.html>
- In the `Cat` and `CatOwner` example:
 - when one object is assigned to another, an alias is created
 - `Cat a = new Cat("Fluffy");`
 - `Cat b = a;`

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Which picture represents the current status of memory?



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Code Development Example



- Constructors
- this
- Instance/static
- Scope
- Random number generation
- Improving consistency of instance values
- toString
- equals