6.005 Lecture 22: Equality
Lecture Exercise
Due at start of next lecture in one week (Mon Dec 3)

This exercise gives you practice with writing and analyzing equals() and hashCode(). Go to office hours if you have trouble with this exercise.

1. Implement equals() and hashCode() for the two classes shown below.
2. Justify each of your implementations with a few sentences saying:
   (a) Why your implementation is an equivalence relation
   (b) Why your equals() and hashCode() are consistent with each other according to the Object contract
   (c) Whether your equals() implements observational or behavioral equality.

```java
public class Plus implements Expr {
    private final Expr e1;
    private final Expr e2;

    public Plus(Expr e1, Expr e2) {
        this.e1 = e1;
        this.e2 = e2;
    }

    public Expr e1() {
        return e1;
    }

    public Expr e2() {
        return e2;
    }

    public Rat eval() throws NoValueException {
        return e1.eval().plus(e2.eval());
    }

    public Expr subst(Var v, Expr e) {
        return new Plus(e1.subst(v,e), e2.subst(v, e));
    }

    public <T> T accept(Visitor<T> visitor) {
        return visitor.onPlus(this);
    }
}
```
public class Person {
    private String name;
    private String email;

    public Person(String name, String email) {
        this.name = name;
        this.email = email;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) { 
        this.name = name;
    }

    public String getEmail() {
        return email;
    }

    public void setEmail(String email) {
        this.email = email;
    }

    public String toString() {
        return name + "<" + email + ">";
    }
}