Matryoshka lab

- How might an object repeat itself?
- What are the three simple steps for repeating with recursion?
- When is it okay to stop?
- Without a loop, how can you know where you are?

Three Simple Rules

To write repetitive code:

1. **Begin by bailing out.** That is, begin at the ending (the termination). Base case.

2. **Process the first.** That is, process the first piece of data.

3. **Process the rest.** That is, let this (recursive) method process the rest of the data.

Structural Recursion

- Refers to a self-referential data structure with natural termination.
- Matryoshka Nesting Dolls

howManyDolls

```
public int howManyDolls()
{
    if(this.innerDoll == null){
        return 1;
    }
    return 1 + this.innerDoll.howManyDolls();
}
```

1. **Begin by bailing out.**
2. **Process the first.**
3. **Process the rest.**

Matryoshka lab part 1

- Add three instance fields to the Matryoshka class; a String called name, a java.awt.Color called hair, and a boolean called babushka. Expand the constructors to assign these fields at instantiation.

- Write a new recursive method, howManyWearingBabushkas. If the babushka field is true, that Matryoshka is wearing a babushka.

- Write a new recursive method, redHeadCount. If the hair is equal to java.awt.Color.RED, that Matryoshka has red hair, sometimes known as being a redhead.

- Write a new recursive method, lastName. If a Matryoshka has no inner doll, then its name is alphabetically last of the collection. If a Matryoshka has an inner doll, and its name is later in the alphabet than the last of the inner doll's collection, then its name is the last name. Otherwise, the last name of the inner doll's collection is the last name. Use the String compareTo method to see which name is later in the alphabet.

Matryoshka lab part 2

- Write a method to recursively count the total number of Matryoshka dolls in an ArrayList of Matryoshka

- Write a method that uses a while loop to count the total number of Matryoshka dolls in an ArrayList of Matryoshka

- Write a method that uses a for loop to count the total number of Matryoshka dolls in an ArrayList of Matryoshka

- Write a method that uses a for each loop to count the total number of Matryoshka dolls in an ArrayList of Matryoshka