CONDITION

false

true

LOOP_BODY
Loops

- Provide a way to run code multiple times
- DRY - Don't Repeat Yourself
- Two types of loops
  - For Loops
  - While Loops
Bart could have used a loop
<table>
<thead>
<tr>
<th>For vs. While</th>
<th>For Loop</th>
<th>While Loop</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Simpler</td>
<td>● More complex</td>
<td></td>
</tr>
<tr>
<td>● Finite set of iterations</td>
<td>● Unknown number of iterations</td>
<td></td>
</tr>
<tr>
<td>● Automatic iteration</td>
<td>● Manual iteration</td>
<td></td>
</tr>
<tr>
<td>● Some good uses:</td>
<td>● Some good uses:</td>
<td></td>
</tr>
<tr>
<td>● Use whenever possible, usually for iterating over a fixed size (e.g. counting to X)</td>
<td>● Run for an indeterminate amount of iteration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Reading files of undetermined size</td>
<td></td>
</tr>
</tbody>
</table>
For Loop

```java
for (int i=0; i<10; i++) {
    System.out.println("Count:" + i);
}
```

- i - short for index or iterator
- Declare the iterator
- Set the range for that iterator
  - Watch for off by one errors
- Set the value to iterator for
While Loop

```java
i = 0       // initialize loop counter
while (i < 10) {
    System.out.println(i);
    i = i + 1; // increment loop counter
}
```

0) initialize loop counter
   (done in the for loop declaration in 'for' loops)
1) check if condition is still true
2) increment counter
   (done by the loop in 'for' loops)
Are you stuck in an infinite loop?

- NO
- YES
Infinite Loop

```java
while (true) {
    System.out.println("Hello");
}
```
Breaking out of a Loop

```java
while (true) {
    System.out.println('inside')
    break;
}
```
i = 0;
while (i < 100):
    i = i + 1;
    if (i % 2):
        continue;
    System.out.println("Odd: ", i);
Nested For Loops

// for the numbers from 1-9
// print that number n-times
// where n is the number from 1-9
// e.g. the number 3 would print “333”
for (int line=1; line<10; line++) {
    // outer loop
    for (int col=1; col<line; col++) {
        // inner loop
        System.out.print(line);
        // print char
    }
    System.out.println(); // print newline
}
Stepping through an example
Stepping through an example

```java
for (int line=1; line<4; line++) {  // outer loop
    System.out.print
    for (int col=1; col<i; i++) {  // inner loop
        System.out.print(line);
        // print char
    }
    System.out.println();  // print newline
}
```