Introduction to Programming
with Java, for Beginners

Loops (while & for)

A “Loop”

- A simple but powerful mechanism for “making lots of things happen!”
- Performs a statement (or block) over & over
- Usually set up to repeat an action until some condition is satisfied
- Computing Scenarios Examples
  - Run an application until user hits “quit” button
  - Deal card hands until game over

Syntax of the while statement

```
while (condition){
    statement(s)
}
```

- `condition` is a true/false (boolean) expression
- If `condition` is initially false, the statement is never executed
- If `condition` is true, `statement` is executed and `condition` is re-evaluated
- The `statement` should eventually make the loop stop

A while Loop to Print Numbers

```
// Print the numbers 1 thru 10
int x = 1;
while (x <= 10){
    System.out.println(x);
    x = x + 1;
}
```

- What happens if you forget the statement `x = x + 1`?
  - We print value 1 forever
  - Known as infinite loop
More *Infinite* Loops

// Some infinite loops are intentional
while (true) {
    statement(s)
}

// Others are not
int x = 5;
while (x < 10) {
    statement(s) which don’t change x
}

---

**For Loop**

```java
for (init; end-test; re-init) {
    statement
}
```

- Executes loop body (statements within {}) as long as *end-test* evaluates to TRUE
- Initialization and re-initialization code included in loop statement
- Note: Test is evaluated **before** executing loop body

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**Compute Square of first 10 numbers**

//In Square.java
int num = 1;
int sqNum = 0;
while (num <= 10) {
    sqNum = num * num;
    System.out.println(num + " " + sqNum);
    num = num + 1;
}

---

**While vs. For**

<table>
<thead>
<tr>
<th>Code</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| int x = 1;  
while (x <= 10){  
    System.out.println(x);  
x = x + 1;  
} | An example of a while loop that has this pattern |

| for (int x = 1; x <= 10; x = x + 1){  
    System.out.println(x);  
} | A for loop that does the same thing |

Note: *For* loops are used generally for bounded iteration
### Summary of Loops

<table>
<thead>
<tr>
<th>Type of Loop</th>
<th>Syntax</th>
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</table>
| while        | `while (condition){
                statement(s)
                }` |
| for          | `for (expr1; condition; expr3){
                statement(s)
                }` |