Loops

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Announcements

- Reminder – readings are due **before** lecture
  - We start off each lecture with a recall activity from your reading!
- Help Sessions and Help Desks
  - Go to them! They make a difference
- **Next Week – Exam Module**
  - **You need to work to have this module open so you can do your Exams**
  - **Catch up if you are behind!**
  - **Ask for help, if you need! Don't hesitate to reach out!**
  - **TAs and myself are here to help you to succeed in this course!**
  - **Don't procrastinate!**

Recall Activity

Grab a paper, write your name, as it is in Canvas, and your answers to the following questions. Turn this as your attendance for today's lecture.

What is the difference between a while loop and a for loop?

Analyze the following method:

```
public static void loop(int max, int inc) {
    for(int i = 0; i < max; i+= inc) {
        System.out.println(i);
    }
}
```

How many lines are printed, given the following call

loop(5, 1)

loop(9, 4)

loop(0, 3)

Recall Activity

```
public static void loop(int max, int inc) {
    for(int i = 0; i < max; i+= inc) {
        System.out.println(i);
    }
}
```

How many lines are printed, given the following call

loop(5, 1)	5
loop(9, 4)	3
loop(0, 3)	0

What are computers good at?

- Computers are good at three things
  - Calculations
  - Formal logic
  - Repeating what you just asked it to do (iteration) - Loops
- Coincidently
  - Three things humans tend to struggle with
- If you understand
  - Calculations
  - Formal Logic
  - And Loops
  - You will be able to accomplish impressive programs

Loop Types in Java (and most languages)

- While Loops
- For Loops
- For:each loops (we will cover this later)
- Do While loops (we will cover this later)
- All loops have
  - An iterator - a way to cycle through the values you want to look at
  - A condition to exit (else, your computer blows up - it happens to everyone)

While Loop

- Good when:
  - Your “iteration” variable is created outside the loop
  - You need your iterator variable outside of the loop

while(TRUE-CONDITION) {/*block of code to execute*/}

```
int end = scan.nextInt();
int start = scan.nextInt();

while(start < end) {
    start++;
}
System.out.println("My Start is now: " + start);
```

While Loop

```
int end = scan.nextInt();
int start = scan.nextInt();

while(start < end) {
    start++;
}
System.out.println("My Start is now: " + start);
```

- Lets assume:

```
end = 3;
start = 1;

while(1 < 3){
   start++;
}
while(2 < 3){
   start++;
}
while(3 < 3) – out of while
System.out.println(“My Start is now: ”+ start);
```

end	start
3	~~1~~
	~~2~~
	3

For Loop

- Good when:
  - Your loop has a set start and end
  - You don’t need to keep your iterator outside the loop

    - for(variables; condition; iterator) { /* block of code to execute*/ }

```
for(int i = 0; i < 10; i++) {
    System.out.print(i);
}
```

For Loop

- How the for works:
  1. control variable is initialized
  2. test condition
     - 2.1. if test if true:
       - execute what is in {}
       - increment control variable and
       - go to step 2 again
     - 2.2. if test if false, exit for

```
for(int i = 0; i < 10; i++) {
    System.out.print(i);
}
```

What is the program output?

```
0123456789
```

What do we need to change to have each number in a different line?

```
System.out.println(i);
```

What do we need to change to print the numbers in the reverse order?

```
for(int i = 9; i >=0; i--)
```

In Class Activity – Loop Practice

- Write a method that reads positive numbers and prints the sum and average of those numbers.

- Think about how you are going to solve this problem
  - What kind of loop do we need? Why?
  - When the loop is going to stop?
  - How many variables do we need? Why?
  - What are those variables types?

In Class Activity – Loop Practice

- Write a method that generates the first hundred even numbers.

- Think about how you are going to solve this problem
  - What kind of loop do we need? Why?
  - When the loop is going to stop?
  - How many variables do we need? Why?
  - What are those variables types?

In Class Activity – Loop Practice

- Write the following as a **for** loop

```
public static void simpleLoop(int total) {

    int i = 1;
    while(i <= total) {
        System.out.print(i + ",");
        i = i + 1;
    }
}
```

Code Along: loop Practice

- Back to Canvas / Zybooks – work on Activity 2 the number game.
- One person codes, the rests assists in the coding
  - Really, everyone trying it, isn’t as beneficial as everyone working together on these!
  - You can always try it on our own later