Introduction to Computers and Programming
Lecture 10: For Loops

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review

• What are the three parts of every loop?
• Where are these three parts in a for loop?
• Where are these three parts in a while loop?
• What is the difference between a while and a do/while loop?
• Which two parts of the for loop will always be executed?
• True or False: You must know at compile time how many iterations you want to execute when using a for loop?
Road map

• Nested for loops
• break
• continue

• Reading:
  – Liang: Chapter 4: 4.6; 4.9
Nested For Loops

• It is also possible to place a for loop inside another for loop.

```java
int rows, columns;
for (rows = 1; rows <= 5; rows++)
{
    for (columns=1; columns<=10; columns++)
        System.out.print("*");
    System.out.println();
}
```

Output:

```
**********
**********
**********
**********
**********
```
Nested For Loops, Example #2

```java
int rows, columns;
for (rows=1; rows<=5; rows++) {
    for (columns=1; columns<=rows; columns++) {
        System.out.print("*");
    }
    System.out.println();
}
```

Output:

```
*
**
***
****
*****
```
break and continue
We have seen the keyword break used in a switch statement:

```java
switch (userInput) {
    case 1:
        userInput++;
        break;
}
```

You can also use break inside of a for, while or do/while loop to immediately exit from the loop.
Example of break use

```java
public class Break {
    public static void main (String [] args) {
        int x;

        for ( x = 1 ; x <= 10; x++) {
            if  (x == 5)
                break;
            System.out.println("The number is : " + x);
        } /* end for x = 1... */
    }
}
```
continue

Continue is a statement which can be used inside a for, while or do/while loop in order to skip the rest of the remaining code in the loop, and start the next iteration.
Example of continue

```java
public class Continue {
    public static void main (String [] args) {
        int x;

        for ( x = 1 ; x <= 10; x++) {
            if (x == 5)
                continue;
            System.out.println("The number is : " + x);
        } /* end for x = 1... */
    }
}
```
Problem

• Use a while loop with a sentinel to read in letter grades of the form A, B, C, D, F. Convert the grades to numerical equivalents, based on the following table, then print out the average grade in numerical form.

<table>
<thead>
<tr>
<th>Letter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Num</td>
<td>4.0</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Structured Programming: Summary
Summary

• Sequence
  – Statement follow one another

• Selection Structures
  – if
  – if/else
  – if/else if/else
  – switch

• Repetition Structures
  – while
  – do/while
  – for