Class 07

While Loops to Repeat an Action, For Loops
Repeated Decisions - Loops

```
while (true/false question) {
    statement(s); // executes repeatedly as long as question is true
}
```

*If question is true, statement executes repeatedly until the question becomes false*
Example 1

- Ask user for positive number. Add up the digits of the number. For example, user enters 1234, computer prints 10 to the monitor.
Example 2

- Ask user for number. Print the first twenty multiples of that number.
## While Loop v. For Loop

<table>
<thead>
<tr>
<th>While Loop</th>
<th>For Loop</th>
</tr>
</thead>
<tbody>
<tr>
<td>int counter = 1, num;</td>
<td>int num;</td>
</tr>
<tr>
<td>cout &lt;&lt; “Enter a number: “;</td>
<td>cout &lt;&lt; “Enter a number: “;</td>
</tr>
<tr>
<td>cin &gt;&gt; num;</td>
<td>cin &gt;&gt; num;</td>
</tr>
</tbody>
</table>
| while (counter <= 20){                          | for (int counter = 1; counter <= 20; counter++){
|   cout << num * counter << “ “;                 |   cout << num * counter << “ “;             |
|   counter++;                                    | }                                          |
| }                                               | }                                          |
For Loops

for (INITIALIZE COUNTER; IS THE COUNTER VALID?; ADJUST COUNTER){
    ACTION;
}

- There are three steps involving the counter, all contained within the for loop parentheses
  - Initialization
  - Check to see if counter is still valid
  - If counter is valid, adjust counter value
Counters

A counter is an integer variable that is incremented (+1) or decremented (-1) each time an action is performed.

- Count up or count down, depending on the program requirements
- We can use counters to keep track of how many values a user entered
- We can use counters to control how many times a loop runs
- Any time your code has to count something, a counter variable is a tool you can use in your code to do this
Example 3

• Say “hello” ten times.
Example 4

- Print all odd numbers between 1 and 100.
Example 5

• Ask the user for a positive integer. Using a while loop, % 10 and / 10 operations, and a counter, count the number of digits it contains.