For Loops

Section 5.6

About Loops

- pre-tested loops execute zero or more times (while loop and for loop)

- conditional loop – executes as long as a particular condition is true (while loop)

- count-controlled loop – executes an exact number of iterations (for loop)

`for` loops

- Count controlled loops must:
  1. initialize a counter variable to a starting value
  2. test the counter variable to a maximum value
  3. update the counter during each iteration

```
//  initialize      test        update

for (int count = 0; count < 5; count++)

{

  cout << count << endl;

}
```

for vs while

This for loop

```
for (int count = 0; count < 5; ++count)
{
  cout << count << endl;
}
```

is equivalent to what **while** loop?

Example

- Write a **for** loop that outputs the odd integers less than 10 and greater than 0

Problem

- Write a program segment that asks the user to enter a positive integer. If the number is not positive, print "Illegal Input"; otherwise, output the integers from the integer entered to 1.

- Do this with a for loop

- Do this with a while loop

Practice

- Write a program that computes the factorial of a number. The factorial of a number is given by the formula below. The user will input a value for N.

- **N! = N * (N–1) * (N–2) * … * 2 * 1**
  - Where 0! = 1, 1! = 1 , 2! = 2, 3! = 6, …

Localized Declarations

```
for (int i = 0; i < 10; i++)
{
  cout << i << endl;
}
cout << i << endl; // This will cause an error
```

- **i** is declared and known ONLY in the loop

- a localized declaration is the only place where a single character variable name is OK

Potential Pitfalls

- What is the output of the following loop

```
int count;
for (count = 0; count < 5; count++)
{
  cout << count << endl;
  count++;
}
```

Problem

- Write a program that allows the user the ability to enter 20 integers, you should then print out the following:
  - o The sum of all integers inputted
  - o The average of all integers inputted
  - o The largest integer of all integers inputted