
do/while and Nested Loops

Section 5.5 & 5.11

Nested Loops

- A loop within a loop

- Example:
 - Find the average of 10 grades for a student
 - Do the above for each of 20 students.
 - How would we write loops to do this?

What is the Output?

```
for (int i = 0; i < 3; i++)
{
    for (int j = 0; j < 2; j++)
    {
        // how many times will this run?
        cout << "*" ;
    }
    // how many times will this run?
    cout << endl ;
}
```

What is the Output?

```
for (int i = 3; i > 0; i-- )
{
    for (int j = i; j < i; j++)
    {
        cout << "*" ;
    }
    cout << endl ;
}
```

Practice

- Write C++ statements that will read in an integer from the user (n) and produce:

1

22

333

4444

. . . .

nnnnnnnnnn

Nested Loops

- Problem: Write a complete C++ program that allows the user the ability to input a number of students in a class and the number of exam scores for each student.
 - Output each students average
 - Output the highest and lowest average in the class

More Nested Loops

Problem: What is the output from the following program segment?

```
int i,j;

for (i = 0; i <= 3; i += 2)
{
    for (j = i; j <= 3; j++)
    {
        cout << setw(3) << i << setw(3) << j << endl;
    }
}
```

Problem: Rewrite the above nested for loop example as a nested while loop.

do/while Repetition Structure

- So far, we have looked at
 - **while**
 - **for**
 - both of these are **pretest** loops
- **do/while** is another repetition structure
- **Post-test**: test happens at the end of the loop

do/while Loops

do

{

```
    cout << "Enter a year:" << endl;
```

```
    cin >> year;
```

```
} while (year < 0); // TEST!
```

```
// The body of the loops happens
```

```
// before the test
```

When to use do while?

- Will always execute at least once
- Perfect for data validation!
- **Post-tested** loop

do

{

statements ;

} while (expression) ;

Example

- Write C++ statements that will read in integers from the user until the user inputs an integer greater than 10.

Practice

Ask the user for an even integer greater than 100. Keep asking until valid input is given.

Practice

Ask the user for a capital letter.
Keep asking until you get valid
input.

What is the Purpose?

```
char ch;  
  
do  
{  
    cout << "Enter a valid code (h,c, i): ";  
    cin >> ch;  
} while ((ch != 'h') && (ch != 'c') && (ch != 'i'));  
  
// how could we rewrite that test?
```

Loop Review

- We have three types of loops
 - while
 - for
 - do/while
- What is each good for?
- How are they different?