Module 18: for loops

Intro to Computer Science 1 - C++

Professor Scott Frees

Textbook

for loops are covered in Section 5.4 in the text

Refresher - incrementing

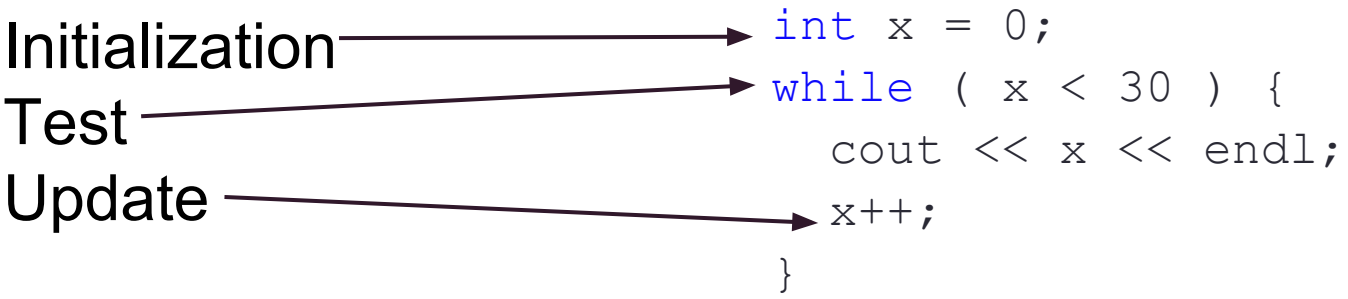
```
count = count + 3  ⟶  count += 3
count = count + 1  ⟶  count += 1
count = count - 2  ⟶  count -= 2

count = count + 1  ⟶  count++
count = count - 1  ⟶  count--
```

Counting vs. Conditional

Conditional Loops: We do not know how many times we will loop…

- Sentinel (number entered != -1)
- Continue? (y/n)
- Input validation

Counting: We will loop some set number of times, known *before* loop is entered



for loops

```
for ( initialization; test; update) {
  statements…
}
```

For example…

```
for ( int i = 0; i < 30; i++) {
  statements…
}
```

Programming Example 20

Calculate the summation of N (given by user)

$$\sum_{i=0}^{i=n} i$$

For example, the *summation* if 3 is $0 + 1 + 2 + 3 = 6$. Below are a few more:

$\Sigma\, 4 = 0 + 1 + 2 + 3 + 4 = \mathbf{10}$
$\Sigma\, 5 = 0 + 1 + 2 + 3 + 4 + 5 = \mathbf{15}$
$\Sigma\, 1 = 0 + 1 = 1$

Programming Example 21

PI can be estimated by computing an *infinite* series…

```
PI = 4 * ( 1 - 1/3 + 1/5 - 1/7 + 1/9 -1/11 +...)
```

Write a program to estimate PI…
How long does it take to get to 3.14159?

Programming Example 22

Nested Loops

Have user enter a number N (between 2 and 10)

Print out a square of * symbols:

x = 3

```
* * *
* * *
* * *
```

How to study

- You don’t get good at programming by watching someone else program…
- You don’t get good at programming by reading about people programming…

You must program yourself!

- Do the Labs again
- Do the Programming Examples yourself

Lab 7

```
*          n = 4
* *
* * *
* * * *
* * *
* *
*
```

Ask a user for a value n, between 1 and 10. Print a half diamond with n stars in the top half.

Guidelines

- Do the top half first (increasing order)
- Do the second half as a completely separate loop
- Remember, you'll print out "n" number of stars on a line the same way whether you are doing the top half or bottom half!