

	<p>Logical Operators and While Loops</p> <p>CS303E: Elements of Computers and Programming June 15, 2012</p>

	<p>Quote of the Day</p>
	<p>Optimism is an occupational hazard of programming: testing is the treatment. - <i>K. Beck</i></p>

	<p>Logical Operators: What are they?</p>
	<ul style="list-style-type: none"> ■ Operators that act on boolean expressions <ul style="list-style-type: none"> – We'll use them mainly on comparisons ■ The result is a boolean ■ and, or, and not

	<p>Logical Operators: How do they work?</p>								
	<table border="1"> <thead> <tr> <th>Logical Operator Expression</th><th>Result</th></tr> </thead> <tbody> <tr> <td>p and q</td><td>True if p and q are both true, otherwise False</td></tr> <tr> <td>p or q</td><td>True if p, q, or both p and q are True, False if both are False</td></tr> <tr> <td>not p</td><td>True if p is False, False if p is True</td></tr> </tbody> </table>	Logical Operator Expression	Result	p and q	True if p and q are both true, otherwise False	p or q	True if p, q, or both p and q are True, False if both are False	not p	True if p is False, False if p is True
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Logical Operators: When do we use them?
<ul style="list-style-type: none"> ■ Decisions (if-elif-else) ■ Loops ...

Examples
<pre> i = 14 j = 18 test = i<j test = i<j and i==i test = not(i<j) test = i<j or j<i test = i<j and j<i </pre>

Examples
<p>What about: a or not b and c ?</p> <p>a or ((not b) and c) Precedence: not and or</p>

iClicker Question: Logical Operators
<p>What is the expected output?</p> <pre> i=23 j=5 k=-19 if(i>20 and k>0): print "i and k" elif(i>20 or j<0): print "i or j" else: print "neither one" </pre> <p> A. i and k B. i or j C. neither one D. i or j neither one </p>

	Loops: What are they?
	<ul style="list-style-type: none"> ■ How we tell the computer to repeat a set of commands <ul style="list-style-type: none"> – Each repetition is called an <i>iteration</i> ■ Two types: <ul style="list-style-type: none"> – Definite: loop a certain number of times <ul style="list-style-type: none"> ■ Next week – Sentinel (Indefinite): loop until the sentinel value is read <ul style="list-style-type: none"> ■ while loop

	While Loops: Examples
	<pre>while I'm hungry: eat another bite</pre> <pre>while there are more lines of text in the input file: read the next line from the file</pre>

	While Loops: When do we use them?
	<ul style="list-style-type: none"> ■ Whenever we are unsure how many times the loop should execute: <ul style="list-style-type: none"> – Reading lists from the user – Reading information from a file – Converging on a solution (math, chemistry, ...) ■ Typically, <i>sentinel</i> loops, where the loop gets and processes values until seeing a special value called the <i>sentinel</i>, that indicates processing should stop.

	While Loops: How do they work?
	<p>Execute a block of code repeatedly as long as the associated condition is true</p> <ul style="list-style-type: none"> – Is the condition true? <ul style="list-style-type: none"> ■ Yes, then execute action, then evaluate the condition, if true, execute the action, then evaluate the condition... ■ No, then skip the loop body and continue with the rest of the code

While Loops: Typical Pseudocode

```
get initial value
while value is not the sentinel:
    process the value
    get the next value
continue with regular code
```

While Loops: Syntax

```
while (<cond>):
    ...
    loop body
    ...
```

Boolean expression
Evaluated every time the loop begins
Loop continues while this is true

Indentation matters!

While Loops: Examples

```
count = 1
while(count<=5):
    count=count+1
print count
```

While Loops: Examples

```
#initialize variables to use in the loop
num = 1
sum = 0

#as long as num is at most 5, add num to sum
while num <= 5:
    sum = sum+num
    num = num+1 #update the loop variable!
    #What happens if you forget?

print "The sum of the first five positive\
integers is ", sum
```

	While Loops: Examples
	<pre> userVal=input("Enter a value or -1 to quit") sum=0 while(userVal != -1): sum=sum+userVal userVal=input("Enter a value or -1 to quit") print sum </pre>

	Loops: Coding Hints
	<p>To create a loop, ask yourself these three questions:</p> <ol style="list-style-type: none"> 1. Where does it start? 2. Where does it end? 3. How do I go from one iteration to the next?

	Exercises
	<ul style="list-style-type: none"> ■ Write a program that prints the integers from 1 to 15, one number per line. ■ Write a program that reads a number n from the keyboard and prints the sum of the first n positive integers ■ Write a program that reads integers from the keyboard and then prints the max and min to the screen

	Exercises
	<ul style="list-style-type: none"> ■ Prompt the user to enter exam scores, entering a negative number to quit. Find the average and print it.

iClicker Question: While Loops	
<p>What is the expected output?</p> <pre>count=5 while(count>0): print count, count = count - 1</pre> <p>A. 5 4 3 2 1 0 C. 1 2 3 4 5 B. 5 4 3 2 1 D. 0 1 2 3 4 5</p>	

Announcements
<ul style="list-style-type: none"> ■ Assignment 2 posted today ■ Exam in TWO weeks ■ On Monday, my office hours will be from 2p-3p NOT 10a-11a – this is a ONE time change ■ Next week, PAI 5.38 is reserved 9a-11 all week (You can use the labs in ENS.)