Decision Structures and Indefinite Loops

Professor Hugh C. Lauer CS-1004 — Introduction to Programming for Non-Majors

(Slides include materials from *Python Programming: An Introduction to Computer Science*, 2nd edition, by John Zelle and copyright notes by Prof. George Heineman of Worcester Polytechnic Institute)

Reading ahead

Needed for bounce.py

Chapter 7:– Decision Structures – esp. §7.1–7.3

- We have already bumped into "if" statements
- You should also know about comparisons, etc.
- Exception Handling:- You will probably encounter it in real life, but we won't spend time on it this term

Chapter 8:- Loops and Booleans — esp. §8.1–8.3 and §8.5

- While loops
- Stopping conditions for loops
- File loops (§8.4) not needed for HW4

Both chapters needed for HW #4

Also, §9.1, 9.2 — simulations!

If-statements

General form:-

if condition:

statements to do if *condition* is true

elif condition2:

statements to do if condition is
not true and condition2 is true
elif ...:

else:

statements to do if none of the above conditions are true

Optional

What is a condition?

Comparisons

A < B, A <= B A > B, A >= B A == B A != B

Other tests

Α	is	B		(i.e., same object)
Α	is	not	В	(i.e, not same object)

```
x in List
c in String
substring in String
```

Combinations

and, or, not parentheses

Anything with a True-False value

Boolean Algebra

Named after George Boole

- 19th century British mathematician
- Invented the algebra of TRUE-FALSE values
- How to reason about them

Applied to relays and switching circuits

- Claude Shannon Master's thesis!
- For organizing railway signals
- Telephone switching networks

Central to all digital circuitry in modern computers

Application to Python

- Any combination of 'conditions' can be tested
- Result is of type 'bool'
- May be stored in variables
 B = (x < y)
- Possible values are True False

Examples

Example

- Comparisons
- If statements
- If with elif statements
- If with else statements
- is and in relationships

Questions?

Indefinite loops

- §8.2 in textbook
- while condition: statements of loop body
- Causes the loop body to be repeated indefinitely until condition stops being True
 - Zero or more times!
 - condition may be updated by loop body or by other means
 - Example

Note pattern for sentinel loop 'Prime' the loop # Later in course While item is not sentinel process item get next item

Break and continue statements

Get out of a loop immediately!

break

Abandon current iteration and start next

continue

Not in textbook!

Example:-

```
for x in list:
```

```
if notInteresting(x):
```

```
continue # Go back to top of loop & new x
y = someComputation(x)
```

```
if boring(y):
```

```
continue # Go back to top of loop & new x
<more computations on x & y>
```

Questions?