PARAMETERS, INDEFINITE LOOPS, AND LOOP PATTERNS

CSSE 120—Rose Hulman Institute of Technology

Review: Python parameter passing

- Formal parameters only receive the **values** of the actual parameters
- Assigning a new value to a formal parameter does not affect the actual parameter
- Python passes actual parameters *by value*
- Can Python functions mutate parameters?

Functions mutating parameters

- Can we write a function that exchanges the values of its two parameters?
- In Eclipse checkout the project named Session11 from your SVN repository
- Study the code in the module mutatingParameters.py but don't run it
  - Together, observe what happens as we trace its execution in the debugger

Modifying Parameters

- How do functions send information back?
  - Return statements
  - *Mutating* parameters
    - Value of actual parameter must be a mutable object
    - State of the mutable object is changed
    - The actual parameter itself is NOT changed since it refers to the same object
    - Parameter is still passed by value

Recap: Two main types of loops

- Definite Loop
  - We know at the beginning of the loop how many times its body will execute
  - Implemented in Python as a **for** loop.
  - Cannot be an infinite loop
- Indefinite loop
  - The body executes as long as some condition is True.
  - Implemented in Python as a **while** statement.
  - Can be an infinite loop if the condition never becomes False.
- Python's `for line in file:` construct
  - indefinite loop that looks syntactically like a definite loop!

Some indefinite loop patterns

- Interactive loops
- Sentinel loops
- File loops
- post-test loops
- "loop and a half"

Interactive: Make the user count

- Open module averageUserCount.py and execute it together
- When does the loop terminate?
- Is this the best way to make the user enter input?
  - Why?
  - Why not?

Interactive: Ask user if there is more

- Open module averageMoreData.py and execute it together
- User no longer has to count, but still has a big burden

Sentinel loop

- Open module averageSentinel.py and study the code then execute it together
- User signals end of data by a special "sentinel“ value
- Note that the sentinel value is not used in calculations

Non-numeric Sentinel

- What if negative numbers are legitimate values?
- Open module averageOtherSentinel.py and study the code
  - Execute it together
  - What is the sentinel?
- **Again note:** sentinel value is not used in calculations.

File loop

- Open module averageFile.py and execute together with input file numbers.txt
- Uses a **for** loop as we have seen before
- Also note the conditional execution of **main()**

Escaping from a loop

- **break** statement ends the loop immediately
  - Does not execute any remaining statements in loop body
- **continue** statement skips the rest of **this** iteration of the loop body
  - Immediately begins the **next** iteration
- **return** statement ends loop and function call
  - May be used with an expression
    - within body of a function that returns a value
  - Or without an expression
    - within body of a function that just does something

Interactive loop with graphics

- Display a window that contains a circle and a message saying "Click inside Circle".
- Whenever the user clicks outside the circle, display "You missed!"
- If the user clicks inside the circle, display "Bull's eye!". Then pause and close the window.
- Implement together in module clickInsideCircle.py

Individual Exercise on Using loops

- Define function **listAndMax()** in module **listMax.py** that
  - Prompts the user to enter numbers, one at a time
  - Uses a blank line (<ENTER>) as sentinel to terminate input
  - Accumulates the numbers in a list
  - Uses a loop to calculate the maximum value of the numbers
  - Returns two values:
    - the list of numbers entered in the order they were entered
    - the maximum value
- Define function **main()** in module **listMax.py** that
  - Calls listAndMax()
  - Prints the list of numbers entered
  - Prints the maximum value of the list of numbers

Q10 – hand in quiz

Start homework

- When you are through with your individual exercise commit your solutions to your svn repository
- Start working on homework 11