

Line Continuation, Output Formatting, and Decision Structures

CS303E: Elements of Computers
and Programming
June 13, 2012

Line Continuation

- What do you do if your line of Python code is too long?
- Use the line continuation character!
 - ‘\’
 - Place at the very end of the line
 - Python interpreter will assume the next line is part of the same line

Output Formatting

- We've seen this:


```
print "The temperature is",temp,"degrees"
```

 - Now, we'll see another way
- Better able to control how `print` displays values
 - 88.33333333 -> 88.33
 - 4 / 15 / 2010 -> 4/15/2010

Output Formatting: Format Operators

- ```
print "The temperature is %d degrees" % temp
```
- String formatting operator: `%`
    - NOT modulus: modulus operates on numbers
    - Appears in strings
  - Indicates *how* and *where* a value should be printed in a string
  - Also indicates end of print string and beginning of the values to be printed

## Output Formatting: Format Operators

```
print "The temperature is %d degrees" % temp
```

Indicates the  
type and  
format of the  
value

Indicates the end of  
the string to be  
printed and the  
beginning of the  
values specified in  
the string

## Output Formatting: Format Specifiers

| Specifier | Value Type  |
|-----------|-------------|
| %d        | integer     |
| %f        | float       |
| %s        | string      |
| %e or %E  | exponential |

For each, you can also specify width and precision:

```
%<width>.<precision><type character>
print "The average is %6.2f" % avg
```

## Output Formatting: Embedded Operations

You can calculate values in your print statement:

```
print "2+3 = %d" % (2+3)
```

```
print "x/y = %.2f" % (x/y)
```

## Output Formatting: Examples

- Explore use of width and precision using `math.pi` in the interpreter
- Modify `average.py` to print 2 decimal places of the average
- Practice printing strings from `raw_input()`
- Print using multiple values
  - The values must be enclosed in parentheses

### iClicker Question: Output Formatting

What is the expected output?

```
x = 5.7
y = 2.18
print "x+y=%.1f" % (x+y)
```

- A. 7      C. 7.9  
B. 7.8    D. 8

### Comparisons

- Allows you to compare two values
- Result in a True or False value
  - type Boolean (bool)
- You can compare numbers or strings, literals, variables, or expressions

### How do you specify a comparison?

Specify the comparison using a *relational operator*

| Operator | Meaning               |
|----------|-----------------------|
| <        | Less than             |
| >        | Greater than          |
| <=       | Less than or equal    |
| >=       | Greater than or equal |
| ==       | Equality              |
| !=       | Not equals            |

### Comparisons: Examples

1. test = 13 < 15
2. test = 101 >= 99
3. test = "a" < "b"
4. test = 4 == 2+2
5. test = 15 != 16
6. test = 12 == 3\*5

| Lexicographic Order                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>■ Strings are rated according to <i>lexicographic</i> order</li> <li>■ Orders words A-Za-z <ul style="list-style-type: none"> <li>– Capital letters first in alphabetical order</li> <li>– Lower-case letters second in alphabetical order</li> </ul> </li> <li>■ NOT in dictionary order</li> </ul> |

| Decisions                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>■ Gives you the ability to specify different instructions based on a condition</li> <li>■ The condition is typically a comparison</li> </ul> <p>if some comparison is true<br/>do something</p> |

| Decisions:<br>if Statement                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>def main():     command     if(&lt;condition&gt;):         command         command         command         command     main()</pre> <p>Commands not dependent on the condition</p> <p>Commands only executed if condition is true</p> <p>Commands not dependent on the condition</p> <p>Indentation matters! (Again)</p> |

| Decisions:<br>if-else Statement                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>if(&lt;condition&gt;):     command     command else:     command     command</pre> <p>Commands only executed if condition is True</p> <p>Commands only executed if condition is False</p> |

| Decisions:<br>if-elif-else Statement                                                                                                                                                       |                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre> if(&lt;condition&gt;):     command     command elif(&lt;condition&gt;):     command     command else:     command     command </pre> <p>You can use as many of these as you like</p> | <p>Commands only executed if condition is True</p> <p>Commands only executed if earlier conditions are False and this condition is True</p> <p>Commands only executed if <b>EVERY</b> condition is False</p> |

| Decisions:<br>Nested ifs                                                                                                                                                                                                                     |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>You can put if statements inside the body of the if (or elif or else) statement:</p> <pre> if(&lt;condition&gt;):     if(&lt;some other condition&gt;):         command     else:         command elif(&lt;condition&gt;):     ... </pre> |  |

| Decisions:<br>Gotchas                                                                                                                                                                                                                                                                                                                      |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <ul style="list-style-type: none"> <li>Exactly ONE of the bodies in if-elif-else will be executed <ul style="list-style-type: none"> <li>Only the first True condition</li> <li>THINK about the construction of your if statements before coding</li> </ul> </li> <li>Comparison of floats <pre>if(.3 == .1+.2) is False</pre> </li> </ul> |  |

| iClicker Question:<br>Decisions                                                                                                                                                                                                                  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>What is the expected output?</p> <pre> if(125&lt;140):     print "first one" elif(156&gt;=140):     print "second one" else:     print "third one" </pre> <p>A. first one      C. third one<br/>B. second one    D. first one, second one</p> |  |

|  |                                                                                                                                                                                                                               |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Exercise</b>                                                                                                                                                                                                               |
|  | Write a program that prompts the user for a number and then prints "You are lucky!" if the number is a multiple of 7, "Dozens and dozens!" if the number is a multiple of 12 (but not of 7), and prints the number otherwise. |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Reminders</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|  | <p>Assignment 2 due tomorrow</p> <ul style="list-style-type: none"><li>– RUN your program before you turn it in<ul style="list-style-type: none"><li>■ If it doesn't run without an error, you get a 0. (No tracebacks!)</li></ul></li><li>– Type it in the EDITOR. Not the interpreter, or it will not RUN.</li><li>– Test it and include your test cases.</li><li>– Turn in your assignment using the RIGHT filename. (EasterSunday.py) Make sure your capitalization is right, too.</li></ul> |