

	<h2>More Functions</h2> <p>CS303E: Elements of Computers and Programming June 22, 2012</p>

	<p>Any fool can write code that a computer can understand. Good programmers write code that humans can understand.</p> <p>- M. Fowler, <i>"Refactoring: Improving the Design of Existing Code"</i></p>

	<h2>Functions: Review</h2>
	<ul style="list-style-type: none"> <li>■ Statements grouped under a special name that are executed together</li> <li>■ Advantages <ul style="list-style-type: none"> <li>– Code reuse <ul style="list-style-type: none"> <li>■ Type once, use again and again!</li> <li>■ Easier to maintain (update, fix mistakes)</li> </ul> </li> <li>– Code readability</li> </ul> </li> </ul>

	<h2>Functions: Syntax</h2>
	<p>Definition Syntax:</p> <pre>def functionName():     statement     statement     ...</pre> <p>Call Syntax:</p> <pre>functionName()</pre>

Function Variables: Scope
<ul style="list-style-type: none"> <li>■ A variable's <i>scope</i> is that part of the program where it may be accessed: <ul style="list-style-type: none"> <li>– After its definition (initialization)</li> </ul> </li> <li>■ <i>Local</i> variables are those that are created inside a function <ul style="list-style-type: none"> <li>– All the variables we have created so far have been local to <code>main()</code></li> </ul> </li> <li>■ A local variable's scope is the function where it was created <ul style="list-style-type: none"> <li>– Cannot be accessed by another function</li> </ul> </li> </ul>

Variable Scope: Example
<pre>def main():      def earth():     wt=0          wt=45     name="Alice"  print "Earth Weight:", wt     earth()     jupiter()     def jupiter():     print wt       wt=40                   wt=wt*2.364                   print "Jupiter Weight:", wt</pre>

iClicker Question: Variable Scope
<p>Variable <code>x</code> is defined in <code>main()</code>. Where can it be accessed?</p> <p>A. In <code>main()</code> before its definition  B. In <code>main()</code> after its definition  C. In <code>main()</code> and every other function in the file  D. Everywhere</p>

iClicker Question
<pre>def func1()      What is the output?     x = 5     result = x * 2    A. 5                      B. 7 def func2()        C. 10     print result     D. Error</pre>

Functions with Parameters
<ul style="list-style-type: none"> <li>■ Parameters are a way to pass information into a function <ul style="list-style-type: none"> <li>– Allows greater re-use</li> </ul> </li> <li>■ <code>range()</code> has parameters <ul style="list-style-type: none"> <li>– The value(s) that tell it what sequence to generate</li> </ul> </li> <li>■ Parameters are local to a function, so their scope is their function</li> </ul>

Functions with Parameters: Syntax
<pre>def functionName(param1, param2):     statement     statement     ...</pre> <p>Function parameters: how information is given to the function</p> <p>These may be empty</p>

Functions with Parameters: Syntax
<p>Recall:</p> <pre>def functionName(param1, param2):</pre> <p>To <i>call</i> that function, use <i>arguments</i>:</p> <pre>functionName(arg1, arg2)</pre> <p>When a function is called:</p> <pre>param1=arg1 param2=arg2</pre> <p>statements in the body are executed</p>

Functions with Parameters: Examples
<pre>printPower.py</pre> <pre>callMeAI.py</pre>

<b>iClicker Question: Functions with Parameters</b>	
Consider this snippet of code: <pre>... x=25 printNum(25) ...</pre>	When <code>printNum</code> is executed from this snippet, what is the output? (Assume <code>printNum()</code> is defined correctly) A. -1 B. 0 C. 25 D. No value

<b>Aside: Available Functions</b>	
<ul style="list-style-type: none"> <li>■ <code>abs()</code></li> <li>■ <code>int()</code></li> <li>■ <code>range()</code></li> <li>■ <code>input()</code></li> <li>■ <code>raw_input()</code></li> <li>■ <code>round()</code></li> <li>■ <code>type()</code></li> </ul>	If you import <code>math</code> : <ul style="list-style-type: none"> <li>■ <code>math.sqrt()</code></li> <li>■ <code>math.ceil()</code></li> <li>■ <code>math.floor()</code></li> <li>■ <code>math.factorial()</code></li> <li>■ <code>math.log()</code></li> <li>■ <code>math.pow()</code></li> <li>■ <code>math.sum()</code></li> </ul>

<b>Exercise</b>	
<p>Write a function <code>make10</code> that, given two ints <code>a</code> and <code>b</code>, prints <code>True</code> if one of them is 10 or if their sum is 10.</p> <p>Write a <code>main()</code> function that uses a for loop to call <code>make10</code> for the values of <code>a</code> from 1 to 10. <code>b</code> has the value 5 for each call.</p>	

<b>Reminders</b>	
<ul style="list-style-type: none"> <li>■ Exam is NEXT WEEK</li> <li>■ Review Wednesday <ul style="list-style-type: none"> <li>– Come prepared to ask questions (or send me email!)</li> <li>– Sample Exam posted today (hopefully)</li> </ul> </li> <li>■ Assignment 3 released today, due SATURDAY 6/30 <ul style="list-style-type: none"> <li>– But doing it before the exam will help you!</li> </ul> </li> </ul>	