

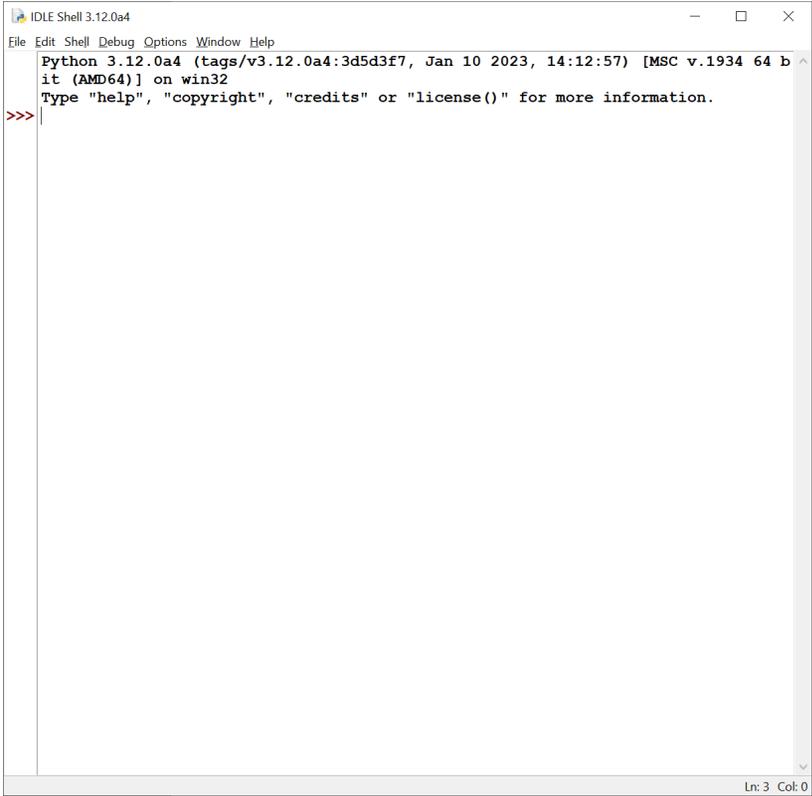
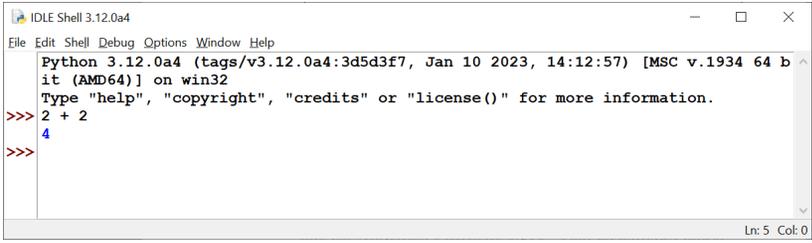
# Invent Your Own Computer Games with Python, 4th edition

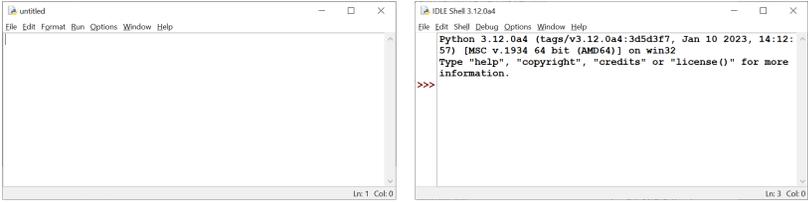
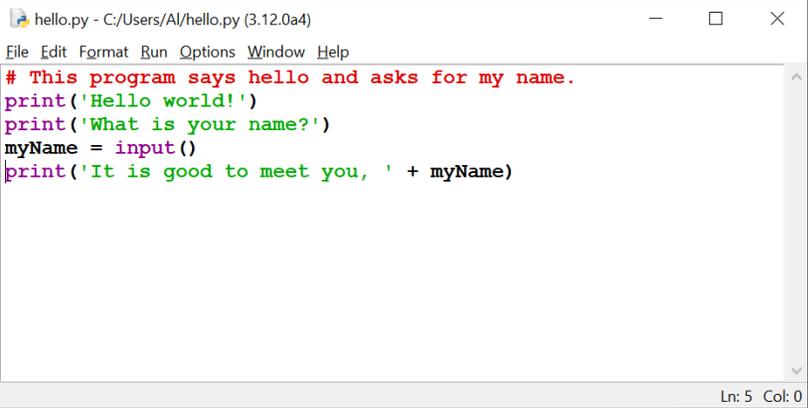
by Al Sweigart

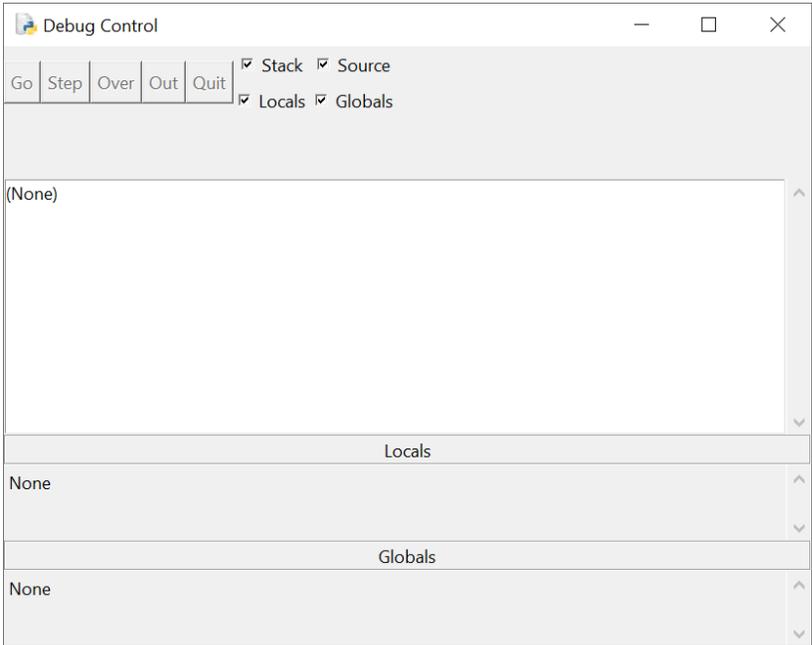
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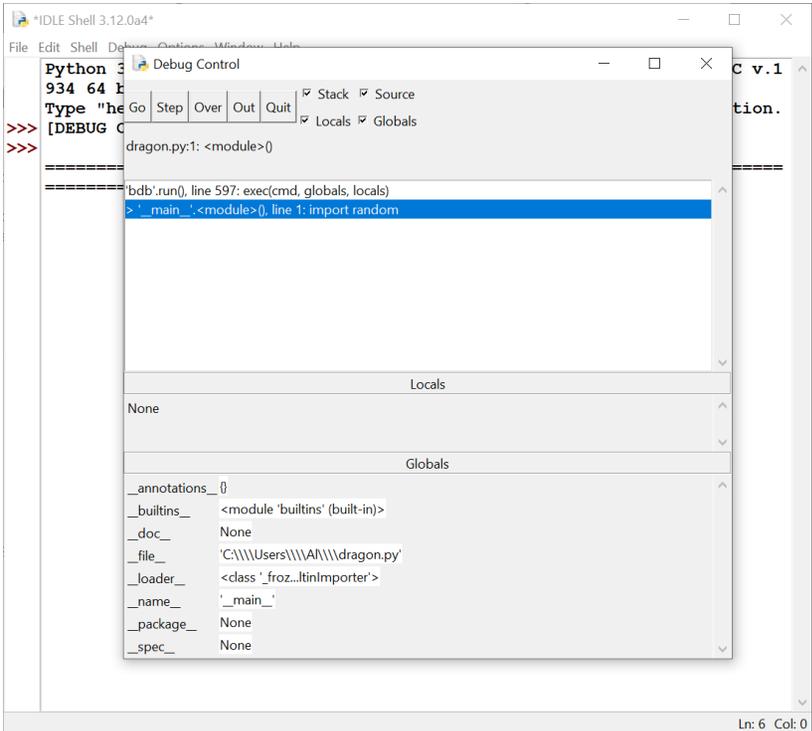
Page	Error	Correction	Print corrected
xxv–xvi	<p>In this section, I'll show you how to download and install Python 3—specifically, Python 3.4—for Windows, OS X, or Ubuntu. There are newer versions of Python than 3.4, but the pygame module, which is used in Chapters 17 to 21, currently only supports up to 3.4.</p> <p>It's important to know that there are some significant differences between Python 2 and Python 3. The programs in this book use Python 3, and you'll get errors if you try to run them with Python 2. This is so important, in fact, that I've added a cartoon penguin to remind you about it.</p> <p>On Windows, download the Windows <b>x86-64 MSI installer from <a href="https://www.python.org/downloads/release/python-344">https://www.python.org/downloads/release/python-344</a></b> and then double-click it. You may have to enter the administrator password for your computer.</p> <p>Follow the instructions the installer displays on the screen to install Python, <b>as listed here:</b></p> <ol style="list-style-type: none"><li>1. Select <b>Install for All Users</b> and then click <b>Next</b>.</li><li>2. Install to the <code>C:\Python34</code> folder by clicking <b>Next</b>.</li><li>3. Click <b>Next</b> to skip the Customize Python section.</li></ol> <p>On <b>OS X</b>, download the <b>Mac OS X 64-bit/32-bit installer from <a href="https://www.python.org/downloads/release/python-344/">https://www.python.org/downloads/release/python-344/</a></b> and then double-click it. Follow the instructions the installer displays on the screen to install Python, <b>as listed here:</b></p> <ol style="list-style-type: none"><li>1. If you get the warning “Python.mpkg' can't be opened because it is from an unidentified developer,” hold down <b>CONTROL</b> while right-clicking the <code>Python.mpkg</code> file and then select <b>Open</b> from the menu that appears. You may have to enter the administrator password for your computer.</li><li>2. Click <b>Continue</b> through the Welcome section and click <b>Agree</b> to accept the license.</li><li>3. Select <b>Macintosh HD</b> (or whatever your hard drive is named) and click <b>Install</b>.</li></ol> <p>If you're running Ubuntu, <b>you can install Python from the Ubuntu Software Center by following these steps:</b></p> <ol style="list-style-type: none"><li>1. Open the Ubuntu Software Center.</li><li>2. Enter <b>Python</b> in the search box in the top-right corner of the window.</li><li>3. Select <b>IDLE (Python 3.4 GUI 64 bit)</b>.</li></ol>	<p><del>In this section, I'll show you how to download and install Python 3—specifically, Python 3.4—for Windows, OS X, or Ubuntu. There are newer versions of Python than 3.4, but the pygame module, which is used in Chapters 17 to 21, currently only supports up to 3.4.</del></p> <p>It's important to know that there are some significant differences between Python 2 and Python 3. The programs in this book use Python 3, and you'll get errors if you try to run them with Python 2. This is so important, in fact, that I've added a cartoon penguin to remind you about it.</p> <p>On Windows, download the Windows <b>installer (64-bit) from <a href="https://www.python.org/downloads/windows/">https://www.python.org/downloads/windows/</a></b> and then double-click it. You may have to enter the administrator password for your computer.</p> <p>Follow the instructions the installer displays on the screen to install Python, <b>as listed here:</b></p> <ol style="list-style-type: none"><li>1. Select <del>Install for All Users</del> and then click <del>Next</del>.</li><li>2. Install to the <code>C:\Python34</code> folder by clicking <del>Next</del>.</li><li>3. Click <del>Next</del> to skip the Customize Python section.</li></ol> <p>On <b>macOS</b>, download the <b>macOS 64-bit universal2 from <a href="https://www.python.org/downloads/macos">https://www.python.org/downloads/macos</a></b> and then double-click it. Follow the instructions the installer displays on the screen to install Python, <b>as listed here:</b></p> <ol style="list-style-type: none"><li>1. If you get the warning “Python.mpkg' can't be opened because it is from an unidentified developer,” hold down <b>CONTROL</b> while right-clicking the <code>Python.mpkg</code> file and then select <b>Open</b> from the menu that appears. You may have to enter the administrator password for your computer.</li><li>2. Click <del>Continue</del> through the Welcome section and click <del>Agree</del> to accept the license.</li><li>3. Select <del>Macintosh HD</del> (or whatever your hard drive is named) and click <del>Install</del>.</li></ol> <p>If you're running Ubuntu, <b>Python is already installed. However, you'll have to install IDLE separately. Press Ctrl-Alt-T to open a new Terminal window. Enter the command <code>sudo apt install idle</code>. The administrator password is needed to run this command.</b></p> <ol style="list-style-type: none"><li>1. <del>Open the Ubuntu Software Center.</del></li><li>2. <del>Enter Python in the search box in the top-right corner of the window.</del></li></ol>	Print 9

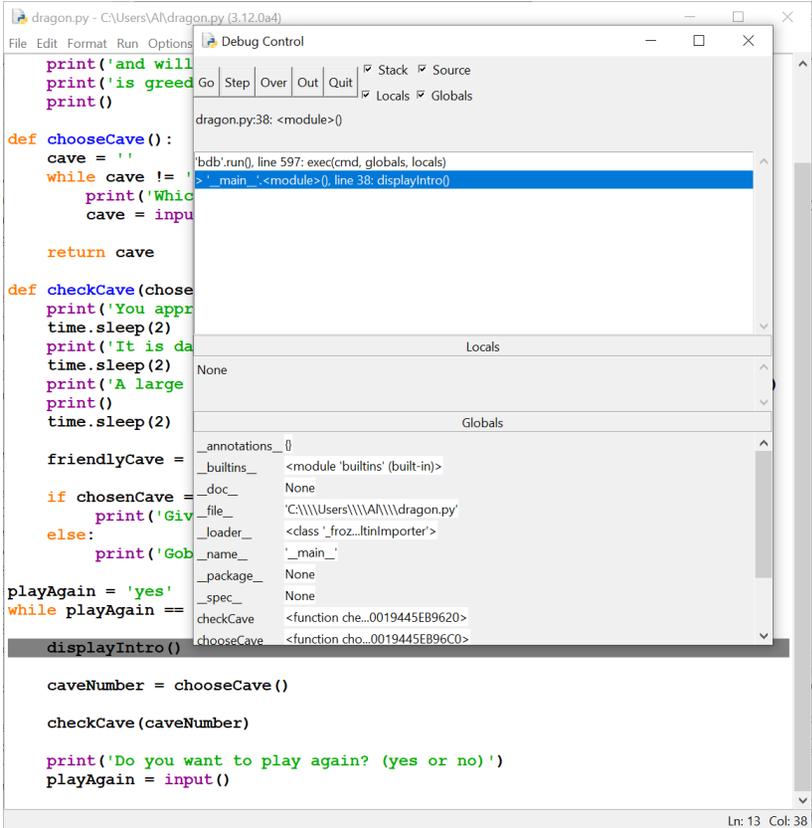
Page	Error	Correction	Print corrected
	<p>4. Click <b>Install</b>. You may have to enter the administrator password to complete the installation.</p> <p>If the above steps do not work, you can find alternative Python <b>3.4</b> install instructions at <a href="https://www.nostarch.com/inventwithpython/">https://www.nostarch.com/inventwithpython/</a>.</p> <h3>Starting IDLE</h3> <p>IDLE stands for <b>I</b>nteractive <b>D</b>eveLopment <b>E</b>nvironment. IDLE is like a word processor for writing Python programs. Starting IDLE is different on each operating system:</p> <ul style="list-style-type: none"> <li>• On Windows, click the <b>Start</b> menu in the lower-left corner of the screen, type <b>IDLE</b>, and select <b>IDLE (Python GUI)</b>.</li> <li>• On <b>OS X</b>, open Finder and click <b>Applications</b>. Double-click <b>Python 3.x</b> and then double-click the IDLE icon.</li> <li>• On Ubuntu or other Linux distros, open a <b>terminal</b> window and enter <b>idle3</b>. You may also be able to click <b>Applications</b> at the top of the screen. Then click <b>Programming</b> and <b>IDLE 3</b>.</li> </ul>	<p><del>3. Select <b>IDLE (Python 3.4 GUI 64 bit)</b>.</del></p> <p><del>4. Click <b>Install</b>. You may have to enter the administrator password to complete the installation.</del></p> <p>If the above steps do not work, you can find alternative Python <del>3.4</del> install instructions at <a href="https://www.nostarch.com/inventwithpython/">https://www.nostarch.com/inventwithpython/</a>.</p> <h3>Starting IDLE</h3> <p>IDLE stands for <b>I</b>nteractive <b>D</b>eveLopment <b>E</b>nvironment. IDLE is like a word processor for writing Python programs. Starting IDLE is different on each operating system:</p> <ul style="list-style-type: none"> <li>• On Windows, click the <b>Start</b> menu in the lower-left corner of the screen, type <b>IDLE</b>, and select <b>IDLE (Python GUI)</b>.</li> <li>• On <b>macOS</b>, open Finder and click <b>Applications</b>. Double-click <b>Python 3.x</b> and then double-click the IDLE icon.</li> <li>• On Ubuntu or other Linux distros, open a <b>Terminal</b> window by pressing <b>Ctrl-Alt-T</b> and enter <b>idle3</b>. You may also be able to click <b>Applications</b> at the top of the screen. Then click <b>Programming</b> and <b>IDLE 3</b>.</li> </ul>	

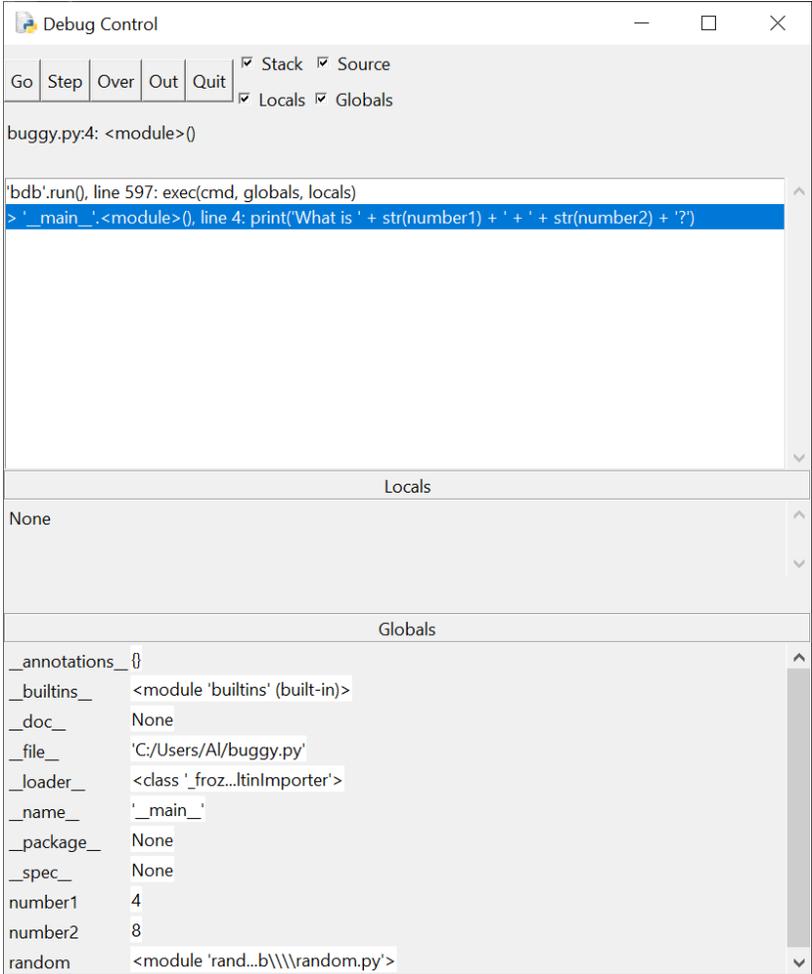
Page	Error	Correction	Print corrected
xxvii	Figure 1 replacement	 <pre> IDLE Shell 3.12.0a4 File Edit Shell Debug Options Window Help Python 3.12.0a4 (tags/v3.12.0a4:3d5d3f7, Jan 10 2023, 14:12:57) [MSC v.1934 64 b it (AMD64)] on win32 Type "help", "copyright", "credits" or "license()" for more information. &gt;&gt;&gt; </pre>	Print 9
2	Figure 1-1 replacement	 <pre> IDLE Shell 3.12.0a4 File Edit Shell Debug Options Window Help Python 3.12.0a4 (tags/v3.12.0a4:3d5d3f7, Jan 10 2023, 14:12:57) [MSC v.1934 64 b it (AMD64)] on win32 Type "help", "copyright", "credits" or "license()" for more information. &gt;&gt;&gt; 2 + 2 4 &gt;&gt;&gt; </pre>	Print 9
7	<pre> &gt;&gt;&gt; spam = 15 &gt;&gt;&gt; spam = spam + 5 20 </pre>	<pre> &gt;&gt;&gt; spam = 15 &gt;&gt;&gt; spam = spam + 5 &gt;&gt;&gt; spam 20 </pre>	Print 3

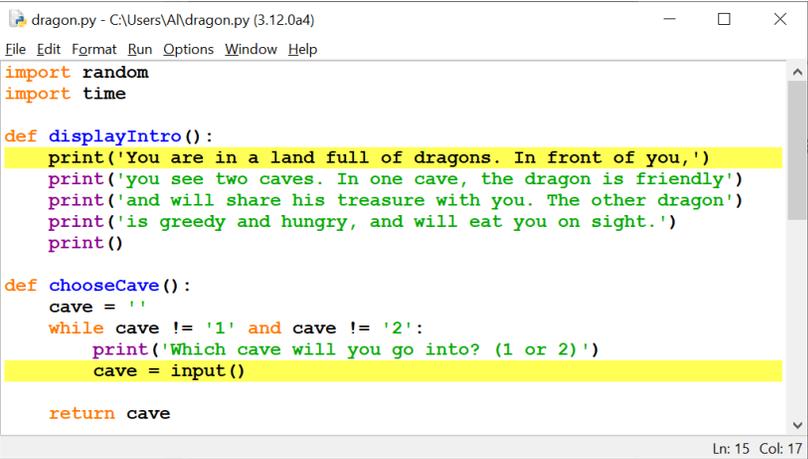
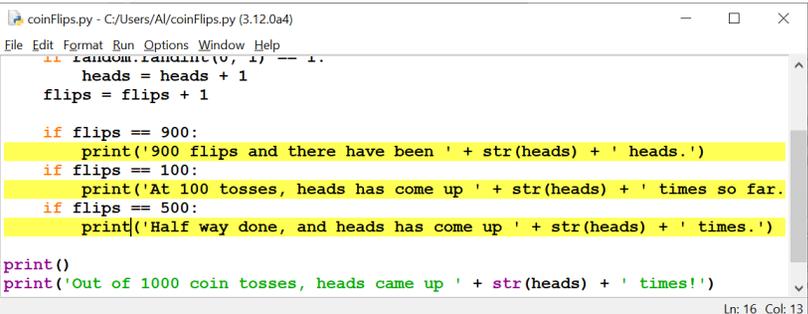
Page	Error	Correction	Print corrected
13	Figure 2-1 replacement		Print 9
15	Figure 2-3 replacement		Print 9
16	install Python 3.4	install Python 3	Print 10
16	Figure 2-5 replacement		Print 9
23	<pre>12. for i in range(6): --snip--</pre>	<pre>12. for guessesTaken in range(6): --snip--</pre>	Print 2

Page	Error	Correction	Print corrected
	<pre>27. guessesTaken = str(guessesTaken)</pre>	<pre>27. guessesTaken = str(guessesTaken + 1)</pre>	
26–29	<pre>12. for i in range(6):</pre>	<pre>12. for guessesTaken in range(6):</pre>	Print 2
30	<pre>TypeError: unorderable types: int() &lt; str()</pre>	<pre>TypeError: '&lt;' not supported between instances of 'int' and 'str'</pre>	Print 9
35	<pre>27. guessesTaken = str(guessesTaken)</pre>	<pre>27. guessesTaken = str(guessesTaken + 1)</pre>	Print 2
35	<p>Line 27 calls the <code>str()</code> function, which returns the string form of <code>guessesTaken</code>. Line 28 concatenates strings to tell the player they have won and how many guesses it took. Only string values can concatenate to other strings. This is why line 27 had to change <code>guessesTaken</code> to the string form.</p>	<p>Line 27 calls the <code>str()</code> function, which returns the string form of <code>guessesTaken</code> <b>plus 1</b> (since the range function goes from 0 to 5 instead of 1 to 6). Line 28 concatenates strings to tell the player they have won and how many guesses it took. Only string values can concatenate to other strings. This is why line 27 had to change <code>guessesTaken + 1</code> to the string form.</p>	Print 2
36	<pre>12. for i in range(4):</pre>	<pre>12. for guessesTaken in range(4):</pre>	Print 2
66	Figure 6-1 replacement	 <p>The screenshot shows the 'Debug Control' window with the following components:</p> <ul style="list-style-type: none"> <li>Buttons: Go, Step, Over, Out, Quit</li> <li>Checkboxes: Stack, Source, Locals, Globals (all checked)</li> <li>Stack panel: (None)</li> <li>Locals panel: None</li> <li>Globals panel: None</li> </ul>	Print 9

Page	Error	Correction	Print corrected
66	Figure 6-2 replacement	 <p>The screenshot shows the Python IDLE Shell 3.12.0a4 interface. A 'Debug Control' window is open, displaying the current execution state. The main window shows the following text:</p> <pre>&gt;&gt;&gt; &gt;&gt;&gt; dragon.py:1: &lt;module&gt;() ===== bdb&gt;.run(), line 597: exec(cmd, globals, locals) &gt; _main_...&lt;module&gt;(), line 1: import random</pre> <p>The 'Debug Control' window has a 'Locals' section showing 'None' and a 'Globals' section showing the following attributes:</p> <ul style="list-style-type: none"><li><code>__annotations__</code>: <code>{}</code></li><li><code>__builtins__</code>: <code>&lt;module 'builtins' (built-in)&gt;</code></li><li><code>__doc__</code>: <code>None</code></li><li><code>__file__</code>: <code>'C:\\Users\\IAI\\dragon.py'</code></li><li><code>__loader__</code>: <code>&lt;class '_froz...ItinImporter'&gt;</code></li><li><code>__name__</code>: <code>'_main_'</code></li><li><code>__package__</code>: <code>None</code></li><li><code>__spec__</code>: <code>None</code></li></ul> <p>The status bar at the bottom right of the IDLE Shell window indicates 'Ln: 6 Col: 0'.</p>	Print 9

Page	Error	Correction	Print corrected
69	Figure 6-3 replacement	 <pre>dragon.py - C:\Users\AI\dragon.py (3.12.0a4) File Edit Format Run Options Debug Control print('and will') print('is greed') print()  def chooseCave():     cave = ''     while cave != '1' and cave != '2':         print('Which cave do you want to enter?')         cave = input()      return cave  def checkCave(chosenCave):     print('You approach the cave...')     time.sleep(2)     print('It is dark...')     time.sleep(2)     print('A large dragon jumps out, ready to eat you.')     time.sleep(2)      friendlyCave = '1'     if chosenCave == friendlyCave:         print('Give the dragon the gold.')     else:         print('Grab the gold before you run!')  playAgain = 'yes' while playAgain == 'yes' or playAgain == 'y':     displayIntro()      caveNumber = chooseCave()      checkCave(caveNumber)      print('Do you want to play again? (yes or no)')     playAgain = input()  Locals None  Globals _annotat... _builtins_ &lt;module 'builtins' (built-in)&gt; _doc_ None _file_ 'C:\\Users\\AI\\dragon.py' _loader_ &lt;class '_froz...tinImporter'&gt; _name_ '_main_' _package_ None _spec_ None checkCave &lt;function che...0019445EB9620&gt; chooseCave &lt;function cho...0019445EB96C0&gt;</pre>	Print 9

Page	Error	Correction	Print corrected
72	Figure 6-4 replacement	 <p>The screenshot shows the Python Debug Control window for a file named 'buggy.py'. The window title is 'Debug Control'. At the top, there are buttons for 'Go', 'Step', 'Over', 'Out', and 'Quit', along with checkboxes for 'Stack', 'Source', 'Locals', and 'Globals'. Below the buttons, the current execution frame is identified as 'buggy.py:4: &lt;module&gt;()'. The main text area shows the following code snippet:</p> <pre>'bdb'.run(), line 597: exec(cmd, globals, locals) &gt; '_main_': &lt;module&gt;(), line 4: print('What is ' + str(number1) + ' + ' + str(number2) + '?')</pre> <p>The second line is highlighted in blue. Below the code area, there are two sections: 'Locals' and 'Globals'. The 'Locals' section is currently empty, showing 'None'. The 'Globals' section contains the following variables and their values:</p> <ul style="list-style-type: none"> <li><code>_annotations_</code>: {}</li> <li><code>_builtins_</code>: &lt;module 'builtins' (built-in)&gt;</li> <li><code>_doc_</code>: None</li> <li><code>_file_</code>: 'C:/Users/Al/buggy.py'</li> <li><code>_loader_</code>: &lt;class '_froz...ItinImporter'&gt;</li> <li><code>_name_</code>: '_main_'</li> <li><code>_package_</code>: None</li> <li><code>_spec_</code>: None</li> <li><code>number1</code>: 4</li> <li><code>number2</code>: 8</li> <li><code>random</code>: &lt;module 'rand...b\\random.py'&gt;</li> </ul>	Print 9

Page	Error	Correction	Print corrected
73	Figure 6-5 replacement	 <pre> dragon.py - C:\Users\AI\dragon.py (3.12.0a4) File Edit Format Run Options Window Help import random import time  def displayIntro():     print('You are in a land full of dragons. In front of you,')     print('you see two caves. In one cave, the dragon is friendly')     print('and will share his treasure with you. The other dragon')     print('is greedy and hungry, and will eat you on sight.')     print()  def chooseCave():     cave = ''     while cave != '1' and cave != '2':         print('Which cave will you go into? (1 or 2)')         cave = input()      return cave </pre>	Print 10
75	Figure 6-6 replacement	 <pre> coinFlips.py - C:\Users\AI\coinFlips.py (3.12.0a4) File Edit Format Run Options Window Help import random heads = 0 flips = 0  while flips &lt; 1000:     if random.randint(0, 1) == 1:         heads = heads + 1     flips = flips + 1      if flips == 900:         print('900 flips and there have been ' + str(heads) + ' heads.')     if flips == 100:         print('At 100 tosses, heads has come up ' + str(heads) + ' times so far.')     if flips == 500:         print('Half way done, and heads has come up ' + str(heads) + ' times.')  print() print('Out of 1000 coin tosses, heads came up ' + str(heads) + ' times!') </pre>	Print 10
117	<pre>105. difficulty = ''</pre>	<pre>105. difficulty = 'X'</pre>	Print 2
160	<pre>TypeError: Can't convert 'int' object to str implicitly</pre>	<pre>TypeError: Can only concatenate str (not "int") to str</pre>	Print 9
234	The <code>showPoints()</code> function calls the <code>getScoreOfBoard()</code> function and then prints the player's and computer's scores:	The <code>printScore()</code> function calls the <code>getScoreOfBoard()</code> function and then prints the player's and computer's scores:	Print 3
236	After printing the board with <code>drawBoard()</code> , the program also prints the current score with a call to <code>showPoints()</code> on line 230.	After printing the board with <code>drawBoard()</code> , the program also prints the current score with a call to <code>printScore()</code> on line 230.	Print 3
256	<b>Download pygame at <a href="https://www.nostarch.com/inventwithpython/">https://www.nostarch.com/inventwithpython/</a>, and follow the instructions for your operating system.</b>	<b>From the interactive shell, run <code>import subprocess, sys; subprocess.run([sys.executable, '-m', 'pip', 'install', 'pygame'])</code>. If this doesn't work, visit</b>	Print 9

Page	Error	Correction	Print corrected
		<a href="https://inventwithpython.com/installpygame/">https://inventwithpython.com/installpygame/</a> for instructions on installing Pygame.	
263	We assign the <b>Font</b> object to the variable text.	We assign the <b>Surface</b> object to the variable text.	Print 5