**The Debugger**

A while loop may loop forever if the condition is always true. Consider the following code (don’t run it just yet).

x = 5

while x == 5:

print("x is 5!")

print("goodbye!")

This will continuously and forever print “x is 5!” over and over (why?). Note that the print “Goodbye” statement might as well not be there. It will never be executed.

The WingIDE may have trouble running this. Try it out. Hit the green button to run it and see what happens. No output, but the shell is hung up running this infinite loop. The only evidence you have that it is running is that the >>> symbols are missing.

To get out of the ***infinite*** ***loop*** like this, click on the “Options” button on the right side of the Python Shell window and choose “Restart Shell”. The >>> should be back.

If your program hangs up (is unresponsive) you may have to close WingIDE and start it up again. Sorry!

**Using the Debug Mode**

When a program isn’t working, we say it “has bugs”. To fix your mistakes is called “***debugging***”. The name predates computers, but it has been solidly entrenched in computer lingo since 1940 when a young computer engineer at Harvard found out that moths in her computer were causing it to malfunction.

A debugger is a very useful tool that allows us to follow the program step by step.

Click on the “Debug” tab on the menu bar at the top of your screen. Notice that the second item on the list is “Stop Debugging”. You will need this in a second :) Now click on the top item: “Start/Continue”.

You will see the effect of the loop. “x is 5!” is printed over and over. It will never stop! Don’t panic. Just Click the “Debug” >> “Stop Debugging” tab.

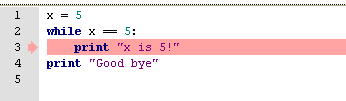
You can also use the icons below. To start debugging, click the little green bug. To stop it, press the red stop sign.



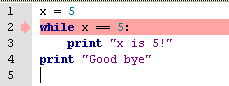
Let’s look at one other button in the debug menu:

**The Step Into Button**

The first grey button is the ***Step Into***button. It allows us to take one step into our program. When you press this button, the first line of code is highlighted red. If you press it again, the next line will highlight. As each line is highlighted, the previous line will have been executed. Once you reach this line:



The code is about to print “x is 5!”. If you press the button one more time, the shell window should show this. What does the program do next?



It goes backwards! This is the effect of the loop. Now it will check again the condition that x is 5. Since x is still 5, it enters the loop again. If you keep stepping through the program, it will go back and forth in the loop.

That should be enough to get you started. We will look at the other buttons and debug options when we need them.

Key Terms: ***infinite loop, debugging, step into button***