

all over again. Programs are usually created by typing definitions into a separate file called a *module* or *script*. This file is saved in secondary memory so that it can be used over and over again.

A module file is just a file of text, and you can create one using any application for editing text, such as notepad or a word processor, provided you save your program as a "plain text" file. A special type of application known as an *Integrated Development Environment* (IDE) simplifies the process. An IDE is specifically designed to help programmers write programs and includes features such as automatic indenting, color highlighting, and interactive development. IDLE is a good example. So far we have just been using IDLE as a Python shell, but it is actually a simple but complete development environment.²

Let's illustrate the use of a module file by writing and running a complete program. Our program will explore a mathematical concept known as chaos. To type this program into IDLE, you should select the *File/New File* menu option. This brings up a blank (non-shell) window where you can type a program. Here is the Python code for our program:

```
# File: chaos.py
# A simple program illustrating chaotic behavior.

def main():
    print("This program illustrates a chaotic function")
    x = eval(input("Enter a number between 0 and 1: "))
    for i in range(10):
        x = 3.9 * x * (1 - x)
        print(x)

main()
```

Once you have typed it in, select *File/Save* from the menu and save it with the name `chaos.py`. The `.py` extension indicates that this is a Python module. Be careful where you save your program. Sometimes IDLE starts you out in the system-wide Python folder by default. Make sure to navigate to a folder where you keep your own files. I'd suggest keeping all of your Python programs together in a dedicated folder in your own personal document area.

At this point, you may be trying to make sense out of what you just typed. You can see that this particular example contains lines to define a new function

²In fact, IDLE stands for Integrated DeveLopment Environment. The extra "L" is thrown in as a tribute to Eric Idle, of Monty Python fame.