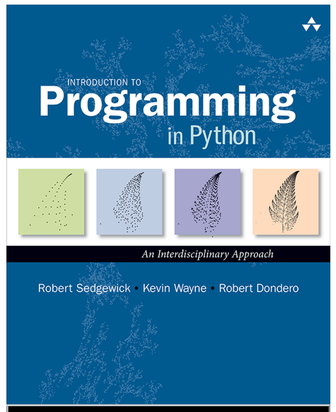

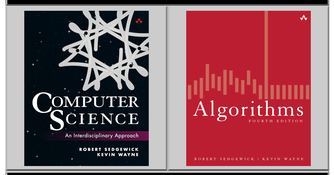

2. Functions and Modules

In this chapter, we consider a concept that has as profound an impact on control flow as do conditionals and loops: the *function*, which allows us to transfer control back and forth between different pieces of code. Functions are important because they allow us to clearly separate tasks within a program and because they provide a general mechanism that enables us to reuse code.

- *2.1 Defining Functions* describes how to create your own functions in Python.
- *2.2 Modules and Clients* describes how to group related functions into modules to enable modular programming.
- *2.3 Recursion* considers the idea of a function calling *itself*. This possiblility is known as recursion.
- *2.4 Case Study: Percolation* presents a case study that uses Monte Carlo simulation to study a natural model known as percolation.

Python Programs in this Chapter

Below is a list of Python programs and data files used in this chapter.

REF	PROGRAM	DESCRIPTION	DATA
2.1.1	harmonicf.py	harmonic numbers (revisited)	–
2.1.2	gauss.py	Gaussian functions	–
2.1.3	coupon.py	coupon collector (revisited)	–
2.1.4	playthattunedeluxe.py	play that tune (revisited)	elise.txt ascale.txt stairwaytoheaven.txt entertainer.txt firstcut.txt freebird.txt looney.txt
2.2.1	gaussian.py	Gaussian functions module	–
2.2.2	gaussiantable.py	sample Gaussian client	–
2.2.3	sierpinski.py	Sierpinski triangle	–
2.2.4	ifs.py	iterated function systems	sierpinski.txt barnsley.txt coral.txt culcita.txt cyclosorus.txt dragon.txt fishbone.txt floor.txt koch.txt spiral.txt swirl.txt tree.txt zigzag.txt
2.2.5	bernoulli.py	Bernoulli trials	–
2.3.1	euclid.py	Euclid's algorithm	–
2.3.2	towersofhanoi.py	towers of Hanoi	–
2.3.3	beckett.py	Gray code	–
2.3.4	htree.py	recursive graphics	–
2.3.5	brownian.py	Brownian bridge	–
2.4.1	percolationv.py	vertical percolation detection	test5.txt test8.txt
2.4.2	percolationio.py	percolation support functions	–
2.4.3	visualizev.py	vertical percolation visualization client	–
2.4.4	estimatev.py	vertical percolation probability estimate	–
2.4.5	percolation.py	percolation detection	test5.txt test8.txt
2.4.6	visualize.py	percolation visualization client	–
2.4.7	estimate.py	percolation probability estimate	–