(a) Hardware vs. Software

(b) Algorithm vs. Program

(c) Programming Language vs. Natural Language

(d) High-Level Language vs. Machine Language

(e) Interpreter vs. Compiler

(f) Syntax vs. Semantics

2. List and explain in your own words the role of each of the five basic functional units of a computer depicted in Figure 1.1.

3. Write a detailed algorithm for making a peanut butter and jelly sandwich (or some other everyday activity). You should assume that you are talking to someone who is conceptually able to do the task, but has never actually done it before. For example, you might be telling a young child.

4. As you will learn in a later chapter, many of the numbers stored in a computer are not exact values, but rather close approximations. For example, the value 0.1 might be stored as 0.10000000000000000555. Usually, such small differences are not a problem; however, given what you have learned about chaotic behavior in Chapter 1, you should realize the need for caution in certain situations. Can you think of examples where this might be a problem? Explain.

5. Trace through the `chaos` program from Section 1.6 by hand using 0.15 as the input value. Show the sequence of output that results.

Programming Exercises

1. Start up an interactive Python session and try typing in each of the following commands. Write down the results you see.

(a) `print("Hello, world!")`

(b) `print("Hello", "world!")`

(c) `print(3)`

(d) `print(3.0)`

(e) `print(2 + 3)`

(f) `print(2.0 + 3.0)`

(g) `print("2" + "3")`

(h) `print("2 + 3 =", 2 + 3)`

(i) `print(2 * 3)`

(j) `print(2 ** 3)`

(k) `print(2 / 3)`