APPENDIX A

INSTALLING PYTHON

THIS appendix explains how to install on your computer the software you will need for programming in the Python programming language. All of the software is distributed by its makers for free and is available for download on the Internet. To make best use of the book there are four software packages you should install: the Python language itself, and the packages "`numpy`", "`matplotlib`", and "`visual`" (also called "VPython" in some places).

There are currently two different versions of Python in circulation, version 2 and version 3. This book uses version 3, which is the most recent and up-to-date version. This appendix describes how to install all the necessary software to use version 3 of Python on your computer.

You can also use version 2 with this book if you wish. Some computers come with version 2 already installed, or you may have installed it yourself in the past and want to go on using it. If so, you can do that, but you need to take one extra precaution. There are a few small differences between versions 2 and 3 that affect some of the programs in the book, but you can get around this by the following simple trick. If you are using version 2 of Python, add the following line at the very beginning of every program you run:

```
from __future__ import division,print_function
```

(Note the two underscore characters "`__`" on either side of the word "`future`".) If you include this line in your programs, it makes version 2 of Python behave essentially the same as version 3. Add it to the start of any of the example programs in the book and they will work with version 2. Add it to the start of the programs you yourself write, and they will work as they would in version 3. You can find further discussion of the differences between Python versions 2 and 3 in Appendix B.

Bearing this in mind, the simplest way to install Python and the additional

packages needed for this book is as follows.

1. Open your web browser and go to `www.python.org`. Click on "download", and on the downloads page find, download, and then install the version of Python you want. As discussed above, you should install version 3, unless you know for certain that you want to use version 2. At the time of writing the most recent sub-version was version 3.2, which will work fine. If you are installing on a Windows computer then (at least at the time of writing) you must use the 32-bit version of Python, not the 64-bit version, which is incompatible with some of the other packages you will need. Even if you have a 64-bit computer, you should still install the 32-bit version. (Python is also available for users of the Linux operating system. The installation procedure is different for Linux, and moreover varies between Linux varieties, but the most widely used varieties, including Ubuntu and Fedora, come with Python packages that can be installed using the standard software installer.)
2. Having installed the Python language you should next install the `visual` package, also sometimes called VPython. Go to `www.vpython.org`, click on the download link for your operating system (Windows or Mac), then download and install the appropriate file. There are different versions of VPython corresponding to the different versions of Python. If, for instance, you installed Python 3.2, you should choose the corresponding version of VPython. If you are using Windows, installing VPython will automatically install the `numpy` package for you as well. If you are using a Mac you will need to install `numpy` separately—see step 4 below.
3. Next you need to install the package `matplotlib`, which you can find at `matplotlib.org/downloads.html`. You should click on the link for the latest version of `matplotlib`, which at the time of writing is version 1.2.1, and you will be presented with a list of packages for different computers. Select and install the one that corresponds to your computer and the version of Python that you installed. For instance, you would click on `matplotlib-1.2.1.win32-py3.2.exe` for a Windows computer with Python version 3.2 installed.
4. If you use a Mac, you will also need to install the package `numpy`. (If you use Windows, `numpy` will already have been installed for you when you installed VPython.) You can download the latest version of `numpy` from `sourceforge.net/projects/numpy/files/NumPy` and install.