Programming Exercises

The exercises in this section are optional and do not report to the performance dashboard. Instructors can decide whether to assign these exercises and students can check the correctness of their programs using the Check Exercise tool.

Note

Solutions to even-numbered exercises in this book are on the Companion Website. Solutions to all exercises are on the Instructor Resource Website. The level of difficulty is rated easy (no star), moderate (*), hard (**), or challenging (***).

Section 1.6

- 1.1 (Display three different messages) Write a program that displays Welcome to Python, Welcome to Computer Science, and Programming is fun.
- 1.2 (Display the same message five times) Write a program that displays Welcome to Python five times.
- *1.3 (*Display a pattern*) Write a program that displays the following pattern:
- **1.4** (*Print a table*) Write a program that displays the following table:
- **1.5** (*Compute expressions*) Write a program that displays the result of

$$\frac{9.5 \times 4.5 - 2.5 \times 3}{45.5 - 3.5}.$$

- **1.6** (Summation of a series) Write a program that displays the result of 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9.
- 1.7 (Approximate

 π)

 π can be computed using the following formula:

$$\pi = 4 \times \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots\right)$$

Write a program that displays the result of $4 \times \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11}\right)$ and $4 \times \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \frac{1}{13} - \frac{1}{15}\right)$.

1.8 (*Area and perimeter of a circle*) Write a program that displays the area and perimeter of a circle that has a radius of 5.5 using the following formula:

$$area = radius \times radius \times \pi$$

$$perimeter = 2 \times radius \times \pi$$

1.9 (*Area and perimeter of a rectangle*) Write a program that displays the area and perimeter of a rectangle with the width of 4.5 and height of 7.9 using the following formula:

$$area = width \times height$$

- 1.10 (Average speed in miles) Assume a runner runs 14 kilometers in 45 minutes and 30 seconds. Write a program that displays the average speed in miles per hour. (Note that 1 mile is 1.6 kilometers.)
- *1.11 (*Population projection*) The US Census Bureau projects population based on the following assumptions:

One birth every 7 seconds

One death every 13 seconds

One new immigrant every 45 seconds

Write a program to display the population for each of the next five years. Assume that the current population is 312032486 and one year has 365 days.

Section 1.9

1.12 (*Turtle: draw four squares*) Write a program that draws four squares in the center of the screen, as shown in Figure 1.12a □.

Figure 1.12

Four squares are drawn in (a), a cross is drawn in (b), a triangle is drawn in (c), and two triangles are drawn in (d).

(Screenshots courtesy of Apple.)

- **1.13** (*Turtle: draw a cross*) Write a program that draws a cross as shown in Figure 1.12b□.
- 1.14 (*Turtle: draw a triangle*) Write a program that draws a triangle as shown in Figure 1.12c □.
- 1.15 (*Turtle: draw two triangles*) Write a program that draws two triangles as shown in Figure 1.12d□.
- **1.16** (*Turtle: draw four circles*) Write a program that draws four circles in the center of the screen, as shown in Figure 1.13a □.

Figure 1.13

Four circles are drawn in (a), a line is drawn in (b), and a star is drawn in (c).

(Screenshots courtesy of Apple.)

- 1.17 (Turtle: draw a line) Write a program that draws a red line connecting two points
 (-39, 48) and (50, -50) and displays the coordinates of the two points, as shown in Figure 1.13b□.
- **1.18 (*Turtle: draw a star*) Write a program that draws a star, as shown in Figure 1.13c. (Hint: The inner angle of each point in the star is 36 degrees.)
 - 1.19 (*Turtle: draw a polygon*) Write a program that draws a polygon that connects the points (40, -69.28), (-40, -69.28), (-80, -9.8), (-40, 69), (40, 69), and (80, 0) in this order, as shown Figure 1.14a□.

Figure 1.14

(a) The program displays a polygon. (b) The program displays a rectanguloid. (c) The program displays a clock for the time.

(Screenshots courtesy of Apple.)

- **1.20** (*Turtle: display a rectanguloid*) Write a program that displays a rectanguloid, as shown in Figure 1.14b□.
- *1.21 (*Turtle: display a clock*) Write a program that displays a clock to show the time 9:15:00, as shown in Figure 1.14c.



Additional programming exercises with solutions are provided to the instructors on the Instructor Resource Website.