**Chapter 1**

Self-Review Exercises 1.1

Fill in the blanks:

a) Programs.

b) The input unit, Output unit, Memory unit, Arithmetic and logic unit (ALU), Central processing unit (CPU), and Secondary storage unit.

c) Machine language, Assembly language, and High-level language.

d) Compilers.

e) Android.

f) Release software.

g) Accelerometer.

Self-Review Exercises 1.2

a) The java command.

b) The javac command.

c) .java file extension.

d) .class file extension.

e) Bytecodes.

Self-Review Exercises 1.3

a) Objects enable the design practice of encapsulation—although they may know how to communicate with one another across well-defined interfaces, they normally are not allowed to know how other objects are implemented.

b) Java programmers concentrate on creating classes, which contain fields and the set of methods that manipulate those fields and provide services to clients.

c) The process of analyzing and designing a system from an object-oriented point of view is called object-oriented analysis and design (OOAD).

d) A new class of objects can be created conveniently by inheritance—the new class (called the subclass) starts with the characteristics of an existing class (called the superclass), possibly customizing them and adding unique characteristics of its own.

e) Unified Modeling Language (UML) is a graphical language that allows people who design software systems to use an industry-standard notation to represent them.

f) The size, shape, color, and weight of an object are considered attributes of the object’s class.

Self-Review Exercises 1.4

a) Input unit.

b) Programming.

c) Assembly language.

d) Output unit.

e) Primary storage (RAM) and secondary storage (hard disk, SSD).

f) Arithmetic and Logic Unit (ALU) is a logical unit of the computer that performs calculations.

g) Central Processing Unit (CPU).

h) High-level languages.

i) Computer’s machine language.

j) Control unit.

Self-Review Exercises 1.5

a) The Java programming language.

b) C initially became widely known as the development language of the UNIX operating system.

c) The Transmission Control Protocol (TCP).

d) The C++ programming language.

Self-Review Exercises 1.6

a) Edit, Compile, Load, Verify, and Execute.

b) A(n) Integrated Development Environment (IDE).

c) The Java Virtual Machine (JVM).

d) A(n) virtual machine (VM).

e) The Class loader.

f) The bytecode.

Self-Review Exercises 1.7

The two compilation phases of Java programs:

1. Compilation Phase: The Java source code (.java file) is compiled using the javac compiler. The compiler translates the Java code into bytecode stored in a .class file.

2. Execution Phase: The JVM loads the .class file. The bytecode verifier checks the bytecode for security issues. The Java interpreter (JVM) executes the bytecode line by line or optimizes it using Just-In-Time (JIT) compilation.

Self-Review Exercises 1.8

Applying object-oriented concepts to a wristwatch:

Object: A wristwatch is an object.

Attributes: Color, size, material, brand, battery life.

Behaviors: Telling time, setting an alarm, displaying date.

Class: A general category of watches (e.g., digital watches, analog watches).

Inheritance: An alarm clock is a subclass of a watch with additional features.

Modeling: Designing different types of watches before production.

Messages: User interactions, such as setting the time.

Encapsulation: The internal mechanism of the watch is hidden from the user.

Interface: The display and buttons that allow interaction.

Information Hiding: The battery mechanism is not visible to the user.

Self-Review Exercises 1.9 - 1.12

These require research and practical exercises:

1.9: Visit carbon footprint calculators and understand emission factors.

1.10: Use BMI calculators and study BMI formulas.

1.11: Research hybrid car attributes like fuel efficiency and battery type.

1.12: Write a program to replace gender-specific words using a dictionary-based approach.