CHAPTER 10

Software Engineering

(Solutions to Practice Set)

Review Questions

1. Software, like many other products, goes through a cycle of repeating phases until it becomes obsolete.

2. In the waterfall model, the development process flows in only one direction. This means that a phase cannot be started until the previous phase is completed. In the incremental model, the process is developed in a series of steps. The software group first completes a simplified version of the whole package. The version represents the entire package but does not include the details.

3. Four phases in the development process are analysis, design, implementation, and testing.

4. In the analysis phase, the analyst prepares a specification document that shows what the software will do without specifying how it will be done. The two trends in this phase are procedure-oriented analysis, and object-oriented analysis.

5. The design phase defines how the system will accomplish what was defined in the analysis phase. In the design phase, all components of the systems are defined. The two trends in this phase are procedure-oriented design, and object-oriented design.

6. Modularity means breaking a large project into smaller parts that can be understood and handled easily. In other words, modularity means to divide a large task into small tasks that can communicate with each other. Two important issues when a system is divided into modules are coupling and cohesion.

7. Cohesion is a measure of how closely the processes in a program are related. Coupling is a measure of how tightly two modules are bound to each other.

8. In the implementation phase the programmers write the programs for the modules (in the procedure-oriented design) or write the program units to implement classes (in the object-oriented design). The quality of software created at the implementation phase is a very important issue.

9. The goal of testing phase is to find errors. There are two types of testing: glass-box (or white-box) and black-box.

10. Glass-box testing is the testing of all of the functionality of a system and is the responsibility of the programmer. Black-box testing is the testing of a system with no knowledge of the program internal and is done by the system test engineer and the user.

Multiple-Choice Questions

11. d	12. a	13. c	14. b	15. d	16. d
17. b	18. d	19. a	20. b		

Exercises

21. Use of constants instead of literals makes the modification much easier if the values are changed latter.

22. Pass-by-value provides less coupling between the two modules.

23. Pass-by reference provides more cohesions between the two modules.

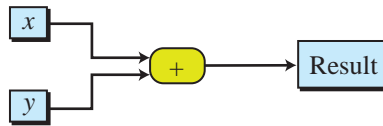24. One possible solution is shown in Figure S10.24.

Figure S10.24 *Exercise 24*
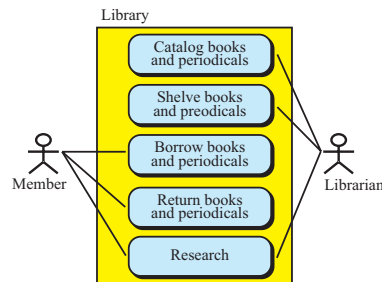
25. One possible solution is shown in Figure S10.25.

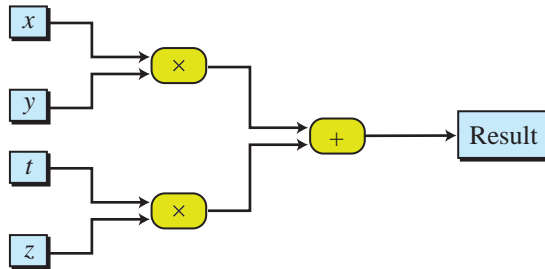**Figure S10.25** *Exercise 25*
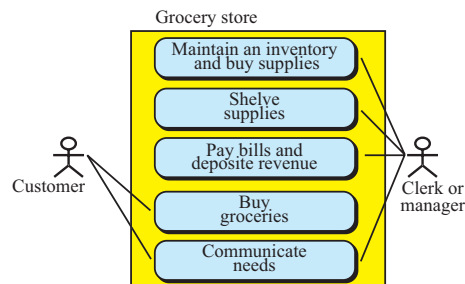
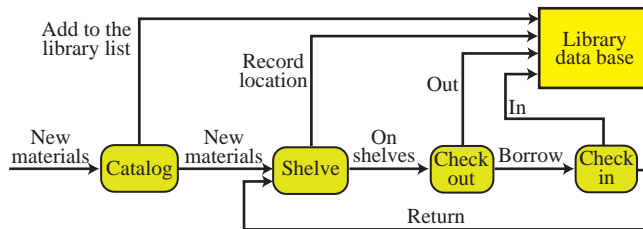26. One possible solution is shown in Figure S10.26.

Figure S10.26   *Exercise 26*

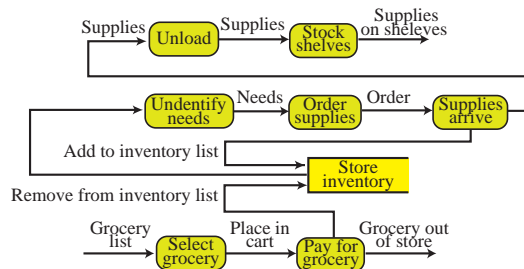27. One possible solution is shown in Figure S10.27.

Figure S10.27   *Exercise 27*

28. One possible solution is shown in Figure S10.28.

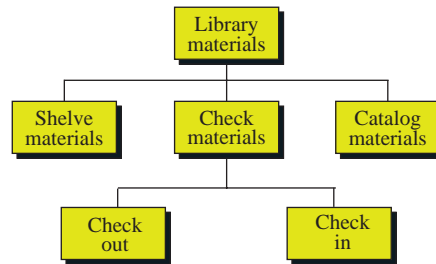**Figure S10.28**   *Exercise 28*

29. One possible solution is shown in Figure S10.29.
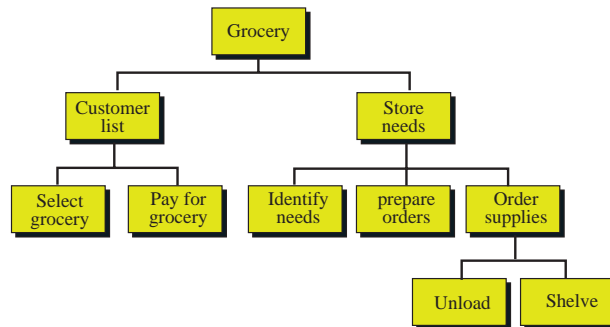
Figure S10.29   *Exercise 29*

30. One possible solution is shown in Figure S10.30.
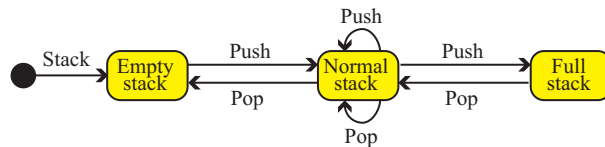
Figure S10.30 *Exercise 30*

31. One possible solution is shown in Figure S10.31.
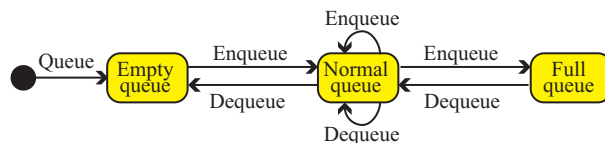
Figure S10.31 *Exercise 31*

32. One possible solution is shown in Figure S10.32.
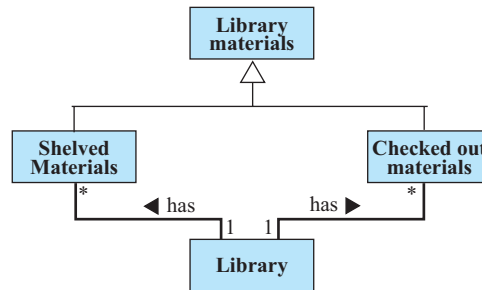
Figure S10.32 *Exercise 32*

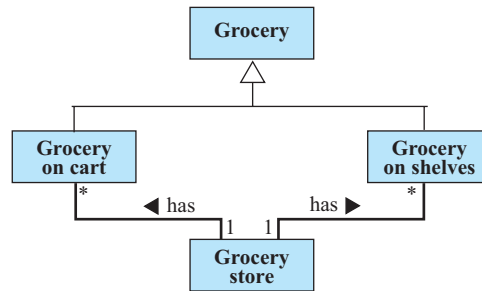33. One possible solution is shown in Figure S10.33.

Figure S10.33 *Exercise 33*

34. One possible solution is shown in Figure S10.34.

Figure S10.34 *Exercise 34*

35. One possible solution is shown in Figure S10.35.

Figure S10.35 *Exercise 35*

36. One possible solution is shown in Figure S10.36.

Figure S10.36 *Exercise 36*

37. One possible solution is shown in Figure S10.37.

Figure S10.37 *Exercise 37*

38. $1000^3 = 10^9$

39.

First integer	Second integer	Third integer
1000	1000	1000
1000	1000	1999
1000	1999	1000
1000	1999	1999
1999	1000	1000
1999	1000	1999
1999	1999	1000
1999	1999	1999

40. For each test we use the following steps:

   a. First, we generate a number between 0 and 0.999,

   b. Second, we multiply the result of part a by 1000 (scaling) to create a number between 0 to 999.

   c. Finally, we add 1000 to the previous result (shifting).

   The testing value is between 1000 to 1999.