Chapter 13

Programming and Languages

**Multiple Choice Questions**

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| 1. | A \_\_\_\_\_\_\_ is a list of instructions for the computer to follow to accomplish the task of processing data into information.      |  |  | | --- | --- | | A. | systems design |  |  |  | | --- | --- | | B. | word processor |  |  |  | | --- | --- | | C. | program |  |  |  | | --- | --- | | D. | systems analysis | |

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| 2. | The list of instructions for the computer to follow to process data.      |  |  | | --- | --- | | A. | System |  |  |  | | --- | --- | | B. | Program |  |  |  | | --- | --- | | C. | Hardware |  |  |  | | --- | --- | | D. | Maintenance | |

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| 3. | The program's objectives, outputs, inputs, and processing requirements are determined during in this step.      |  |  | | --- | --- | | A. | Program documentation |  |  |  | | --- | --- | | B. | Program design |  |  |  | | --- | --- | | C. | Program code |  |  |  | | --- | --- | | D. | Program specification | |

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| 4. | Program objectives, desired outputs, needed inputs, and processing requirements are all recorded in this.      |  |  | | --- | --- | | A. | Program tracking log |  |  |  | | --- | --- | | B. | Project management database |  |  |  | | --- | --- | | C. | Program specifications document |  |  |  | | --- | --- | | D. | Management information system | |

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| 5. | These consist of logically related programming statements.      |  |  | | --- | --- | | A. | Modules |  |  |  | | --- | --- | | B. | Units |  |  |  | | --- | --- | | C. | Objects |  |  |  | | --- | --- | | D. | Components | |

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| 6. | This is an outline of the logic of the program you will write.      |  |  | | --- | --- | | A. | Flowcharts |  |  |  | | --- | --- | | B. | Pseudocode |  |  |  | | --- | --- | | C. | Coding |  |  |  | | --- | --- | | D. | Testing | |

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| 7. | Identify the programming tool that uses symbols to show the sequence of steps needed to solve a programming problem.      |  |  | | --- | --- | | A. | Histogram |  |  |  | | --- | --- | | B. | Pseudocode |  |  |  | | --- | --- | | C. | Scatter diagram |  |  |  | | --- | --- | | D. | Flowcharts | |

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| 8. | In this logic structure, one program statement follows another.      |  |  | | --- | --- | | A. | Sequential |  |  |  | | --- | --- | | B. | Selection |  |  |  | | --- | --- | | C. | Loop |  |  |  | | --- | --- | | D. | Random | |

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| 9. | In this logic structure, the outcome of the decision determines which of the two paths to follow.      |  |  | | --- | --- | | A. | IF-THEN-ELSE |  |  |  | | --- | --- | | B. | DO UNTIL |  |  |  | | --- | --- | | C. | DO WHILE |  |  |  | | --- | --- | | D. | DO NEXT | |

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| 10. | This logic structure involves repeating a sequence as long as a certain condition remains true.      |  |  | | --- | --- | | A. | Loop |  |  |  | | --- | --- | | B. | Sequence |  |  |  | | --- | --- | | C. | Conditional |  |  |  | | --- | --- | | D. | Selection | |

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| 11. | One of the best ways to code effective programs is to write so-called \_\_\_\_\_\_\_ programs, using the logic structures.      |  |  | | --- | --- | | A. | unstructured |  |  |  | | --- | --- | | B. | structured |  |  |  | | --- | --- | | C. | content-markup |  |  |  | | --- | --- | | D. | object-oriented | |

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| 12. | This is the process of testing and eliminating errors in a program.      |  |  | | --- | --- | | A. | Debugging |  |  |  | | --- | --- | | B. | Modularizing |  |  |  | | --- | --- | | C. | Coding |  |  |  | | --- | --- | | D. | Clarifying | |

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| 13. | This type of error could be the result of the programmer making an incorrect calculation.      |  |  | | --- | --- | | A. | Syntax |  |  |  | | --- | --- | | B. | Run time |  |  |  | | --- | --- | | C. | Logic |  |  |  | | --- | --- | | D. | Compiler | |

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| 14. | This is testing a program by a select group of potential users.      |  |  | | --- | --- | | A. | Manual testing |  |  |  | | --- | --- | | B. | Desk checking |  |  |  | | --- | --- | | C. | Attempt at translation |  |  |  | | --- | --- | | D. | Beta testing | |

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| 15. | This consists of written descriptions and procedures about a program and how to use it.      |  |  | | --- | --- | | A. | Tabloids |  |  |  | | --- | --- | | B. | Tables |  |  |  | | --- | --- | | C. | Documentation |  |  |  | | --- | --- | | D. | Status reports | |

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| 16. | As much as 75 percent of the total lifetime cost for an application program is spent on this.      |  |  | | --- | --- | | A. | Electricity |  |  |  | | --- | --- | | B. | Storage |  |  |  | | --- | --- | | C. | Documentation |  |  |  | | --- | --- | | D. | Maintenance | |

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| 17. | Which of the following refers to tools that are used to provide some assistance in designing, coding, and testing software?      |  |  | | --- | --- | | A. | CAM |  |  |  | | --- | --- | | B. | CAD |  |  |  | | --- | --- | | C. | CASE |  |  |  | | --- | --- | | D. | OOP | |

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| 18. | This type of software development focuses less on the procedures and more on defining the relationships between previously defined procedures.      |  |  | | --- | --- | | A. | Unstructured |  |  |  | | --- | --- | | B. | Structured |  |  |  | | --- | --- | | C. | Content-markup |  |  |  | | --- | --- | | D. | Object-oriented | |

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| 19. | These first generation languages are hard to use, with one of the reasons being that they are different depending on the make of the computer.      |  |  | | --- | --- | | A. | Procedural |  |  |  | | --- | --- | | B. | Task-oriented |  |  |  | | --- | --- | | C. | Natural |  |  |  | | --- | --- | | D. | Machine | |

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| 20. | These second generation languages use abbreviations or mnemonics that make it easier for humans to understand.      |  |  | | --- | --- | | A. | Assembly |  |  |  | | --- | --- | | B. | Object-Oriented |  |  |  | | --- | --- | | C. | Procedural |  |  |  | | --- | --- | | D. | High-level | |

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| 21. | These third generation languages are designed to express the logic that can solve general problems.      |  |  | | --- | --- | | A. | Machine |  |  |  | | --- | --- | | B. | Procedural |  |  |  | | --- | --- | | C. | Assembly |  |  |  | | --- | --- | | D. | Content-Markup | |

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| 22. | A compiler \_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | converts the procedural language one statement at a time |  |  |  | | --- | --- | | B. | converts the source code into a machine language code |  |  |  | | --- | --- | | C. | translates instruction codes from assembler language into machine language |  |  |  | | --- | --- | | D. | uses statements to tell objects to perform actions on themselves | |

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| 23. | An interpreter \_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | converts the procedural language one statement at a time |  |  |  | | --- | --- | | B. | converts the source code into machine language code |  |  |  | | --- | --- | | C. | uses statements to tell objects to perform actions on themselves |  |  |  | | --- | --- | | D. | translates software code from assembly language into machine language | |

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| 24. | Fifth-generation languages (5GLs) incorporate the concepts of which of the following?      |  |  | | --- | --- | | A. | Object-oriented programming |  |  |  | | --- | --- | | B. | Artificial intelligence |  |  |  | | --- | --- | | C. | Application generators |  |  |  | | --- | --- | | D. | Abbreviations and mnemonics | |

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| 25. | This type of language uses natural languages to allow humans to communicate more directly to a computer.      |  |  | | --- | --- | | A. | Machine |  |  |  | | --- | --- | | B. | Assembly |  |  |  | | --- | --- | | C. | High-Level Procedural |  |  |  | | --- | --- | | D. | Problem and constraint | |

**True / False Questions**

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| 26. | Programming is simply typing words into a computer.    True    False |

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| 27. | One of the items to be defined in the program specification is the program's objectives.    True    False |

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| 28. | Top-down program design is used to identify the program's processing steps after the outputs and inputs have been determined.    True    False |

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| 29. | Pseudocode is an outline of the logic of the program you would like to write.    True    False |

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| 30. | A condition must be met before a sequential structure can proceed to the next statement.    True    False |

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| 31. | Pseudocode graphically presents the detailed sequence of steps needed to solve a programming problem.    True    False |

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| 32. | The DO WHILE loop means that the loop statements will be executed as long as a certain condition exists.    True    False |

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| 33. | DO WHILE is an example of a sequential structure.    True    False |

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| 34. | The report at the end of the program design step typically consists of pseudocode, flowcharts, and logic structures.    True    False |

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| 35. | Coding is only one of the six steps of programming.    True    False |

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| 36. | A programming language uses symbols, words, and phrases to instruct a computer to perform specific operations.    True    False |

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| 37. | During the testing process, sometimes a program is checked for errors by following the steps with a calculator and sample data.    True    False |

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| 38. | For an attempt at translation to work as a form of the testing process, the program must be free of logic errors to be able to run.    True    False |

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| 39. | Program documentation is intended only for end-users.    True    False |

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| 40. | Program maintenance involves ensuring that current programs are operating error-free, efficiently, and effectively.    True    False |

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| 41. | CASE tools are used to compile programs to test for logic errors.    True    False |

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| 42. | C++ is an example of a machine language.    True    False |

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| 43. | C++ is a procedural language that is widely used by today's programmers.    True    False |

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| 44. | A 5GL language incorporates the concepts of artificial intelligence to allow a person to provide a system with a problem and some constraints, and then request a solution.    True    False |

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| 45. | Agile software development starts by getting core functionality of a program working, and then expands on it until the customer is satisfied with the results.    True    False |

**Fill in the Blank Questions**

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| 46. | Programming is also called \_\_\_\_\_\_\_ development.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 47. | \_\_\_\_\_\_\_ programming techniques consist of top-down program design, pseudocode, flowcharts, and logic structures.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 48. | Time cards containing statements of hours worked are an example of \_\_\_\_\_\_\_ data.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 49. | The defining of tasks that are required for input data to be processed into output is part of the processing \_\_\_\_\_\_\_ step.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 50. | Using structured programming techniques, the program's processing steps can be identified using \_\_\_\_\_\_\_ program design.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 51. | \_\_\_\_\_\_\_ is an outline of the logic of the program that will be written.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 52. | Sequential is a type of \_\_\_\_\_\_\_ structure in which one program statement follows another.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 53. | The \_\_\_\_\_\_\_ structure occurs when a decision must be made.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 54. | The repetition, or \_\_\_\_\_\_\_ structure, describes a process that may be repeated as long as a certain condition remains true.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 55. | Program \_\_\_\_\_\_\_ graphically present the detailed sequence of steps needed to solve a programming problem.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 56. | IF-THEN-ELSE is a(n) \_\_\_\_\_\_\_ structure, one of the types of logic structures.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 57. | One of the six steps of programming is writing the program, also called \_\_\_\_\_\_\_.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 58. | A(n) \_\_\_\_\_\_\_ error occurs when the programmer uses an incorrect calculation or leaves out a programming procedure.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 59. | A(n) \_\_\_\_\_\_\_ error is a violation of the rules of the programming language.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 60. | Proofreading a printout of a program is known as desk checking or code \_\_\_\_\_\_\_.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 61. | Documentation written for programmers should include text and program flowcharts, \_\_\_\_\_\_\_, and sample output as well as system flowcharts.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 62. | Activities in the program maintenance area fall under two categories: \_\_\_\_\_\_\_ and changing needs.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 63. | In OOP, each \_\_\_\_\_\_\_ contains both the data and processing operations necessary to perform a task.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 64. | \_\_\_\_\_\_\_ languages can be run on more than one kind of computer.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| 65. | An application \_\_\_\_\_\_\_ is a program that provides modules of prewritten code.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Essay Questions**

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| 66. | List and briefly explain the six steps in programming. |

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| 67. | Briefly explain pseudocode, flowcharts, and the three logic structures. |

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| 68. | Differentiate between a syntax error and a logic error. |

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| 69. | Name and briefly explain methods of testing a program for errors. |

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| 70. | Identify and explain the two categories of activities in program maintenance. |

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| 71. | What is object-oriented programming? |

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| 72. | List and briefly explain the five generations of programming languages. |

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| 73. | Compare and contrast a compiler and an interpreter. |

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| 74. | Explain the purpose of a query language and list a commonly-used query language. |

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| 75. | What is an application generator and why is it used? |

Chapter 13 Programming and Languages Answer Key

**Multiple Choice Questions**

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| 1. *(p. 330)* | A \_\_\_\_\_\_\_ is a list of instructions for the computer to follow to accomplish the task of processing data into information.      |  |  | | --- | --- | | A. | systems design |  |  |  | | --- | --- | | B. | word processor |  |  |  | | --- | --- | | **C.** | program |  |  |  | | --- | --- | | D. | systems analysis | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: What is Programming?* |

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| 2. *(p. 330)* | The list of instructions for the computer to follow to process data.      |  |  | | --- | --- | | A. | System |  |  |  | | --- | --- | | **B.** | Program |  |  |  | | --- | --- | | C. | Hardware |  |  |  | | --- | --- | | D. | Maintenance | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Programs and Programming* |

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| 3. *(p. 331)* | The program's objectives, outputs, inputs, and processing requirements are determined during in this step.      |  |  | | --- | --- | | A. | Program documentation |  |  |  | | --- | --- | | B. | Program design |  |  |  | | --- | --- | | C. | Program code |  |  |  | | --- | --- | | **D.** | Program specification | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 1: Program Specification* |

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| 4. *(p. 333)* | Program objectives, desired outputs, needed inputs, and processing requirements are all recorded in this.      |  |  | | --- | --- | | A. | Program tracking log |  |  |  | | --- | --- | | B. | Project management database |  |  |  | | --- | --- | | **C.** | Program specifications document |  |  |  | | --- | --- | | D. | Management information system | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 1: Program Specification* |

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| 5. *(p. 334)* | These consist of logically related programming statements.      |  |  | | --- | --- | | **A.** | Modules |  |  |  | | --- | --- | | B. | Units |  |  |  | | --- | --- | | C. | Objects |  |  |  | | --- | --- | | D. | Components | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 6. *(p. 335)* | This is an outline of the logic of the program you will write.      |  |  | | --- | --- | | A. | Flowcharts |  |  |  | | --- | --- | | **B.** | Pseudocode |  |  |  | | --- | --- | | C. | Coding |  |  |  | | --- | --- | | D. | Testing | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 7. *(p. 335)* | Identify the programming tool that uses symbols to show the sequence of steps needed to solve a programming problem.      |  |  | | --- | --- | | A. | Histogram |  |  |  | | --- | --- | | B. | Pseudocode |  |  |  | | --- | --- | | C. | Scatter diagram |  |  |  | | --- | --- | | **D.** | Flowcharts | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 8. *(p. 337)* | In this logic structure, one program statement follows another.      |  |  | | --- | --- | | **A.** | Sequential |  |  |  | | --- | --- | | B. | Selection |  |  |  | | --- | --- | | C. | Loop |  |  |  | | --- | --- | | D. | Random | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 9. *(p. 337)* | In this logic structure, the outcome of the decision determines which of the two paths to follow.      |  |  | | --- | --- | | **A.** | IF-THEN-ELSE |  |  |  | | --- | --- | | B. | DO UNTIL |  |  |  | | --- | --- | | C. | DO WHILE |  |  |  | | --- | --- | | D. | DO NEXT | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 10. *(p. 337)* | This logic structure involves repeating a sequence as long as a certain condition remains true.      |  |  | | --- | --- | | **A.** | Loop |  |  |  | | --- | --- | | B. | Sequence |  |  |  | | --- | --- | | C. | Conditional |  |  |  | | --- | --- | | D. | Selection | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 11. *(p. 338)* | One of the best ways to code effective programs is to write so-called \_\_\_\_\_\_\_ programs, using the logic structures.      |  |  | | --- | --- | | A. | unstructured |  |  |  | | --- | --- | | B. | structured |  |  |  | | --- | --- | | **C.** | content-markup |  |  |  | | --- | --- | | D. | object-oriented | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 3: Program Code* |

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| 12. *(p. 340)* | This is the process of testing and eliminating errors in a program.      |  |  | | --- | --- | | **A.** | Debugging |  |  |  | | --- | --- | | B. | Modularizing |  |  |  | | --- | --- | | C. | Coding |  |  |  | | --- | --- | | D. | Clarifying | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 13. *(p. 340)* | This type of error could be the result of the programmer making an incorrect calculation.      |  |  | | --- | --- | | A. | Syntax |  |  |  | | --- | --- | | B. | Run time |  |  |  | | --- | --- | | **C.** | Logic |  |  |  | | --- | --- | | D. | Compiler | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 14. *(p. 341)* | This is testing a program by a select group of potential users.      |  |  | | --- | --- | | A. | Manual testing |  |  |  | | --- | --- | | B. | Desk checking |  |  |  | | --- | --- | | C. | Attempt at translation |  |  |  | | --- | --- | | **D.** | Beta testing | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 15. *(p. 342)* | This consists of written descriptions and procedures about a program and how to use it.      |  |  | | --- | --- | | A. | Tabloids |  |  |  | | --- | --- | | B. | Tables |  |  |  | | --- | --- | | **C.** | Documentation |  |  |  | | --- | --- | | D. | Status reports | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 5: Program Documentation* |

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| 16. *(p. 343)* | As much as 75 percent of the total lifetime cost for an application program is spent on this.      |  |  | | --- | --- | | A. | Electricity |  |  |  | | --- | --- | | B. | Storage |  |  |  | | --- | --- | | C. | Documentation |  |  |  | | --- | --- | | **D.** | Maintenance | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 6: Program Maintenance* |

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| 17. *(p. 344)* | Which of the following refers to tools that are used to provide some assistance in designing, coding, and testing software?      |  |  | | --- | --- | | A. | CAM |  |  |  | | --- | --- | | B. | CAD |  |  |  | | --- | --- | | **C.** | CASE |  |  |  | | --- | --- | | D. | OOP | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-04 Describe CASE tools and object-oriented software development Topic: CASE and OOP* |

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| 18. *(p. 344-345)* | This type of software development focuses less on the procedures and more on defining the relationships between previously defined procedures.      |  |  | | --- | --- | | A. | Unstructured |  |  |  | | --- | --- | | B. | Structured |  |  |  | | --- | --- | | C. | Content-markup |  |  |  | | --- | --- | | **D.** | Object-oriented | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-04 Describe CASE tools and object-oriented software development Topic: CASE and OOP* |

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| 19. *(p. 346)* | These first generation languages are hard to use, with one of the reasons being that they are different depending on the make of the computer.      |  |  | | --- | --- | | A. | Procedural |  |  |  | | --- | --- | | B. | Task-oriented |  |  |  | | --- | --- | | C. | Natural |  |  |  | | --- | --- | | **D.** | Machine | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 20. *(p. 346)* | These second generation languages use abbreviations or mnemonics that make it easier for humans to understand.      |  |  | | --- | --- | | **A.** | Assembly |  |  |  | | --- | --- | | B. | Object-Oriented |  |  |  | | --- | --- | | C. | Procedural |  |  |  | | --- | --- | | D. | High-level | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 21. *(p. 347)* | These third generation languages are designed to express the logic that can solve general problems.      |  |  | | --- | --- | | A. | Machine |  |  |  | | --- | --- | | **B.** | Procedural |  |  |  | | --- | --- | | C. | Assembly |  |  |  | | --- | --- | | D. | Content-Markup | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 22. *(p. 347)* | A compiler \_\_\_\_\_\_\_.      |  |  | | --- | --- | | A. | converts the procedural language one statement at a time |  |  |  | | --- | --- | | **B.** | converts the source code into a machine language code |  |  |  | | --- | --- | | C. | translates instruction codes from assembler language into machine language |  |  |  | | --- | --- | | D. | uses statements to tell objects to perform actions on themselves | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Apply Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 23. *(p. 347)* | An interpreter \_\_\_\_\_\_\_.      |  |  | | --- | --- | | **A.** | converts the procedural language one statement at a time |  |  |  | | --- | --- | | B. | converts the source code into machine language code |  |  |  | | --- | --- | | C. | uses statements to tell objects to perform actions on themselves |  |  |  | | --- | --- | | D. | translates software code from assembly language into machine language | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Apply Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 24. *(p. 348)* | Fifth-generation languages (5GLs) incorporate the concepts of which of the following?      |  |  | | --- | --- | | A. | Object-oriented programming |  |  |  | | --- | --- | | **B.** | Artificial intelligence |  |  |  | | --- | --- | | C. | Application generators |  |  |  | | --- | --- | | D. | Abbreviations and mnemonics | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 25. *(p. 348)* | This type of language uses natural languages to allow humans to communicate more directly to a computer.      |  |  | | --- | --- | | A. | Machine |  |  |  | | --- | --- | | B. | Assembly |  |  |  | | --- | --- | | C. | High-Level Procedural |  |  |  | | --- | --- | | **D.** | Problem and constraint | |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

**True / False Questions**

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| 26. *(p. 330-331)* | Programming is simply typing words into a computer.    **FALSE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Programs and Programming* |

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| 27. *(p. 331)* | One of the items to be defined in the program specification is the program's objectives.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: What is Programming?* |

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| 28. *(p. 334)* | Top-down program design is used to identify the program's processing steps after the outputs and inputs have been determined.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 29. *(p. 335)* | Pseudocode is an outline of the logic of the program you would like to write.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 30. *(p. 337)* | A condition must be met before a sequential structure can proceed to the next statement.    **FALSE** |

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| *AACSB: Analytic AACSB: Technology Accessibility: Keyboard Navigation Blooms: Analyze Difficulty: 3 Hard Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 31. *(p. 335)* | Pseudocode graphically presents the detailed sequence of steps needed to solve a programming problem.    **FALSE** |

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| *AACSB: Analytic AACSB: Technology Accessibility: Keyboard Navigation Blooms: Analyze Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 32. *(p. 337)* | The DO WHILE loop means that the loop statements will be executed as long as a certain condition exists.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Apply Difficulty: 3 Hard Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 33. *(p. 337)* | DO WHILE is an example of a sequential structure.    **FALSE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 34. *(p. 337)* | The report at the end of the program design step typically consists of pseudocode, flowcharts, and logic structures.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 35. *(p. 338)* | Coding is only one of the six steps of programming.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 3: Program Code* |

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| 36. *(p. 338)* | A programming language uses symbols, words, and phrases to instruct a computer to perform specific operations.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 3: Program Code* |

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| 37. *(p. 341)* | During the testing process, sometimes a program is checked for errors by following the steps with a calculator and sample data.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 38. *(p. 341)* | For an attempt at translation to work as a form of the testing process, the program must be free of logic errors to be able to run.    **FALSE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 39. *(p. 342)* | Program documentation is intended only for end-users.    **FALSE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 5: Program Documentation* |

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| 40. *(p. 343)* | Program maintenance involves ensuring that current programs are operating error-free, efficiently, and effectively.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 6: Program Maintenance* |

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| 41. *(p. 344)* | CASE tools are used to compile programs to test for logic errors.    **FALSE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Analyze Difficulty: 3 Hard Learning Outcome: 13-04 Describe CASE tools and object-oriented software development Topic: CASE and OOP* |

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| 42. *(p. 346)* | C++ is an example of a machine language.    **FALSE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-04 Describe CASE tools and object-oriented software development Topic: CASE and OOP* |

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| 43. *(p. 347)* | C++ is a procedural language that is widely used by today's programmers.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 44. *(p. 348)* | A 5GL language incorporates the concepts of artificial intelligence to allow a person to provide a system with a problem and some constraints, and then request a solution.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 45. *(p. 343-344)* | Agile software development starts by getting core functionality of a program working, and then expands on it until the customer is satisfied with the results.    **TRUE** |

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| *AACSB: Technology Accessibility: Keyboard Navigation Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Generations of Programming Languages* |

**Fill in the Blank Questions**

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| 46. *(p. 330)* | Programming is also called \_\_\_\_\_\_\_ development.    **software** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: What is Programming?* |

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| 47. *(p. 334)* | \_\_\_\_\_\_\_ programming techniques consist of top-down program design, pseudocode, flowcharts, and logic structures.    **Structured** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 2: Program Design* |

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| 48. *(p. 333)* | Time cards containing statements of hours worked are an example of \_\_\_\_\_\_\_ data.    **input** |

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| *AACSB: Technology Blooms: Apply Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 1: Program Specification* |

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| 49. *(p. 333)* | The defining of tasks that are required for input data to be processed into output is part of the processing \_\_\_\_\_\_\_ step.    **requirements** |

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| *AACSB: Technology Blooms: Apply Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 1: Program Specification* |

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| 50. *(p. 334)* | Using structured programming techniques, the program's processing steps can be identified using \_\_\_\_\_\_\_ program design.    **top-down** |

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| *AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 51. *(p. 335)* | \_\_\_\_\_\_\_ is an outline of the logic of the program that will be written.    **Pseudocode** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 52. *(p. 337)* | Sequential is a type of \_\_\_\_\_\_\_ structure in which one program statement follows another.    **logic** |

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| *AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 53. *(p. 337)* | The \_\_\_\_\_\_\_ structure occurs when a decision must be made.    **selection** |

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| *AACSB: Technology Blooms: Apply Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 54. *(p. 337)* | The repetition, or \_\_\_\_\_\_\_ structure, describes a process that may be repeated as long as a certain condition remains true.    **loop** |

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| *AACSB: Technology Blooms: Apply Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 55. *(p. 335)* | Program \_\_\_\_\_\_\_ graphically present the detailed sequence of steps needed to solve a programming problem.    **flowcharts** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 56. *(p. 337)* | IF-THEN-ELSE is a(n) \_\_\_\_\_\_\_ structure, one of the types of logic structures.    **selection** |

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| *AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 57. *(p. 338)* | One of the six steps of programming is writing the program, also called \_\_\_\_\_\_\_.    **coding** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 3: Program Code* |

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| 58. *(p. 340)* | A(n) \_\_\_\_\_\_\_ error occurs when the programmer uses an incorrect calculation or leaves out a programming procedure.    **logic** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 59. *(p. 340)* | A(n) \_\_\_\_\_\_\_ error is a violation of the rules of the programming language.    **syntax** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 60. *(p. 340)* | Proofreading a printout of a program is known as desk checking or code \_\_\_\_\_\_\_.    **review** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 61. *(p. 342)* | Documentation written for programmers should include text and program flowcharts, \_\_\_\_\_\_\_, and sample output as well as system flowcharts.    **program listings** |

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| *AACSB: Technology Blooms: Apply Difficulty: 3 Hard Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 5: Program Documentation* |

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| 62. *(p. 343)* | Activities in the program maintenance area fall under two categories: \_\_\_\_\_\_\_ and changing needs.    **operations** |

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| *AACSB: Technology Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 6: Program Maintenance* |

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| 63. *(p. 345)* | In OOP, each \_\_\_\_\_\_\_ contains both the data and processing operations necessary to perform a task.    **object** |

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| *AACSB: Technology Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-04 Describe CASE tools and object-oriented software development Topic: CASE and OOP* |

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| 64. *(p. 346)* | \_\_\_\_\_\_\_ languages can be run on more than one kind of computer.    **Portable** |

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| *AACSB: Technology Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 65. *(p. 348)* | An application \_\_\_\_\_\_\_ is a program that provides modules of prewritten code.    **generator** |

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| *AACSB: Technology Blooms: Remember Difficulty: 1 Easy Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

**Essay Questions**

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| 66. *(p. 331)* | List and briefly explain the six steps in programming.     The six steps in programming are program specification, program design, program code, program test, program documentation, and program maintenance. During the first step, program specification, the program's objectives, outputs, inputs, and processing requirements are determined. Next, during program design, a solution is created using programming techniques such as top-down program design, pseudocode, flowcharts, and logic structures. Writing the program is called coding. During the program code step, the program is coded using a programming language. Next, the program is tested or debugged by looking for syntax and logic errors. Program documentation is an ongoing process. This phase specifically focuses on formalizing the written description and processes used in the program. Finally, during program maintenance, the completed program is periodically reviewed to evaluate its accuracy, efficiency, standardization, and ease of use. Changes are made to the program's code as needed. |

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| *AACSB: Reflective Thinking AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: What is Programming?* |

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| 67. *(p. 335-337)* | Briefly explain pseudocode, flowcharts, and the three logic structures.     Pseudocode is an outline of the logic of the program you will write. It is like doing a summary of the program before it is written. Program flowcharts graphically present the detailed sequence of steps needed to solve a programming problem. Logic structures link the various parts of the flowchart. The three logic structures are sequential, selection, and repetition. In the sequential structure, one program statement follows another. The selection structure occurs when a decision must be made. The outcome of the decision determines which of two paths to follow. This structure is also known as an IF-THEN-ELSE structure because that is how you can formulate the decision. The repetition or loop structure describes a process that may be repeated as long as a certain condition remains true. The structure is called a "loop" or "iteration" because the program loops around (iterates or repeats) again and again. |

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| *AACSB: Reflective Thinking AACSB: Technology Blooms: Remember Difficulty: 2 Medium Learning Outcome: 13-02 Compare design tools including top-down design, pseudocode, flowcharts, and logic structures Topic: Step 2: Program Design* |

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| 68. *(p. 340)* | Differentiate between a syntax error and a logic error.     A syntax error is a violation of the rules of the programming language. For example, in C++, each statement has to end with a semicolon (;). If the semicolon is omitted, the program will not run due to a syntax error. A logic error occurs when the programmer uses an incorrect calculation or leaves out a programming procedure. For example, a payroll program that did not compute overtime hours would have a logic error. |

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| *AACSB: Analytic AACSB: Reflective Thinking AACSB: Technology Blooms: Analyze Difficulty: 3 Hard Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 69. *(p. 340-341)* | Name and briefly explain methods of testing a program for errors.     There are many methods to test a program for errors. In desk checking or code review, a programmer sitting at a desk checks (proofreads) a printout of the program. You can also test a program by manually testing with sample data. For example, using a calculator and sample data, a programmer would follow each program statement and performs every calculation. During an attempt at translation, the program is run through a computer using a translator program. The translator attempts to translate the written program from the programming language (such as C++) into the machine language. Before the program will run, it must be free of syntax errors. After all syntax errors have been corrected, the program is tested for logic errors. Sample data is used to test the correct execution of each program statement. Finally, beta testing by a select group of potential users is usually the final step in testing a program. Potential users try out the program and provide feedback. |

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| *AACSB: Reflective Thinking AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-03 Describe program testing and the tools for finding and removing errors Topic: Step 4: Program Test* |

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| 70. *(p. 343)* | Identify and explain the two categories of activities in program maintenance.     The activities that fall under program maintenance are broadly categorized as operations and changing needs. The three tasks under the operations area of program maintenance are the following: searching for and correcting operational errors, making programs easier to use, and standardizing software using structured programming techniques. For properly designed programs, these activities should be minimal. The category of changing needs is unavoidable, as all organizations change over time and their programs must change with them. Programs need to be adjusted for a variety of reasons, including new tax laws, new information needs, and new company policies. Significant revisions may require that the entire programming process begin again with program specifications. |

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| *AACSB: Reflective Thinking AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-01 Define programming and describe the six steps of programming Topic: Step 6: Program Maintenance* |

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| 71. *(p. 344-345)* | What is object-oriented programming?     Object-oriented software development focuses less on the procedures and more on defining the relationships between previously defined procedures or "objects." Object-oriented programming (OOP) is a process by which a program is organized into objects. Each object contains both the data and processing operations necessary to perform a task. Object-oriented programs use objects that are reusable, self-contained components. Programs built with these objects assume that certain functions are the same. There is no need to invent a given activity anew every time. |

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| *AACSB: Reflective Thinking AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-04 Describe CASE tools and object-oriented software development Topic: CASE and OOP* |

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| 72. *(p. 346-348)* | List and briefly explain the five generations of programming languages.     Machine languages are the first generation of programming languages. Machine languages use a two-state system (such as 1s and 0s) to construct letters, numbers, punctuation marks, and other special characters. The second generation of programming languages is assembly languages. Assembly languages use abbreviations or mnemonics that are automatically converted to 1s and 0s. High-level procedural languages are the third generation (3GLs). They are considered portable because, unlike machine and assembly languages, they can be run on more than one kind of computer. 3GLs are designed to express the logic (the procedures) that can solve general problems. However, 3GLs still require some training to use them. 4GLs (fourth-generation languages) are task-oriented languages, also known as very high level languages. They are designed to solve specific problems and require little special training on the part of the user. They are more English-like, easier to program, and widely used by nonprogrammers. Finally, the fifth generation languages incorporate the concepts of artificial intelligence to allow a person to provide a system with a problem and some constraints, and then request a solution. They allow communication with the computer via natural languages. |

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| *AACSB: Reflective Thinking AACSB: Technology Blooms: Understand Difficulty: 3 Hard Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 73. *(p. 347)* | Compare and contrast a compiler and an interpreter.     A compiler converts the programmer's procedural language program, called the source code, into a machine language code, called the object code. This object code can then be saved and run later. An interpreter converts the procedural language one statement at a time into machine code just before it is to be executed. No object code is saved. The difference between the two is that when a program is run, the compiler requires two steps: one step to convert the entire program's source code to object code, and a second step to run the object code. The interpreter, in contrast, converts and runs the program one line at a time. The advantage of a compiler language is that once the object code has been obtained, the program executes faster. The advantage of an interpreter language is that programs are easier to develop. |

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| *AACSB: Analytic AACSB: Reflective Thinking AACSB: Technology Blooms: Analyze Difficulty: 3 Hard Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 74. *(p. 347)* | Explain the purpose of a query language and list a commonly-used query language.     Query languages enable nonprogrammers to use certain easily understood commands to search and generate reports from a database. One of the most widely used query languages is SQL (structured query language). |

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| *AACSB: Reflective Thinking AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |

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| 75. *(p. 348)* | What is an application generator and why is it used?     An application generator or a program coder is a program that provides modules of prewritten code. When using an application generator, a programmer can quickly create a program by referencing the appropriate module(s). This greatly reduces the time to create an application. |

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| *AACSB: Reflective Thinking AACSB: Technology Blooms: Understand Difficulty: 2 Medium Learning Outcome: 13-05 Explain the five generations of programming languages Topic: Generations of Programming Languages* |