

Review questions for Chapter 9

Answer first, then check at the end.

True/False

1. A compiler translates a high-level language program into the corresponding program in machine code.
2. An interpreter is a simulator that executes high-level language code directly.
3. A compiler and an interpreter both accept a program in a high-level language as input.
4. A compiler and an interpreter produce the same output.
5. Bytecode is a standard machine language into which Java source code is compiled.
6. The Java Virtual Machine is a hypothetical computer that executes Bytecode.
7. Boolean expressions are used to make decisions in a high-level language.
8. . Strong typing is a mechanism by which a high-level program is entered into a computer.
9. A variable declaration associates the variable name with a data.
- 10.. A declaration is an example of a control structure.
- 11.. An IF statement is an example of a control structure
- 12.. A parameter is a mechanism that allows data to be passed into a subprogram.
- 13.Clicking a mouse is an example of asynchronous processing.
- 14.A loop can be nested within a selection statement, but a selection statement cannot be nested within a loop.
- 15.Encapsulation is a language feature that enforces information hiding.
- 16.. A class as a language construct is a pattern for an object.
- 17.Instantiation is the process of creating an object from a class.

18. Polymorphism is the ability of a language to have duplicate method names in an inheritance hierarchy and to apply the method that is appropriate for the object to which the method is applied.
19. Second generation high-level programming languages come in one of two varieties: those that are compiled such as COBOL and those that are interpreted like APL.
20. Two identifiers with the same spelling but different capitalization are considered to be the same identifiers in languages that are case sensitive (like Python)
21. In asynchronous processing, the processing is under the control of events occurring outside the sequence of processing instructions.

Multiple Choice

22. Which of the following translates a high-level language program into machine code?
- A. procedure
 - B. interpreter
 - C. Bytecode
 - D. paradigm
 - E. compiler
23. Which of the following translates and executes program statements in sequence, instead of having separate translation and execution steps?
- A. procedure
 - B. interpreter
 - C. Bytecode
 - D. paradigm
 - E. compiler
24. Which of the following is executed by the Java Virtual machine?
- A. procedure
 - B. interpreter
 - C. Bytecode
 - D. paradigm
 - E. compiler
25. Which of the following produces a true or false result?
- A. control structure
 - B. strong typing
 - C. data type
 - D. Boolean expression
 - E. declaration

26. Which of the following requires that only a value of the proper type can be stored into a variable?

- A. control structure
- B. strong typing
- C. data type
- D. Boolean expression
- E. declaration

27. Which of the following associates a variable name with its data type?

- A. control structure
- B. strong typing
- C. comment
- D. Boolean expression
- E. declaration

28. Which of the following include selection statements and repetition statements?

- A. control structure
- B. Strong typing
- C. data type
- D. Boolean expression
- E. declaration

29. Which of the following languages has an IF statement for making decisions?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

30. Which of the following languages uses Boolean expressions in their selection and repetition statements?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

31. Which of the following languages can be used to create an infinite loop?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

32. Which of the following languages does not require declarations?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

33. Which of the following languages uses indentions to indicate blocks of code?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

34. Which of the following languages uses the word then with the IF statement?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

35. Which of the following languages does NOT enclose the expression in a WHILE statement in parenthesis?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

36. Which of the following languages allow only value parameters?

- A. Java and C++
- B. C++ and VB.NET
- C. Python and Java
- D. VB.NET and Java
- E. All of the above

37. Which of the following is the ability for a subprogram to call itself?

- A. argument
- B. parameter
- C. recursion
- D. nested logic
- E. asynchronous processing

38. Which of the following allows a WHILE loop to be contained within the body of another while loop?

- A. subprogram

- B. parameter
- C. recursion
- D. nested logic
- E. asynchronous processing

39. Which of the following allows information to be passed into a subprogram?

- A. record
- B. parameter
- C. recursion
- D. nested logic
- E. asynchronous processing

40. Clicking a mouse button is an example of which of the following?

- A. subprogram
- B. parameter
- C. recursion
- D. nested logic
- E. asynchronous processing

41. The dominant languages used in industry throughout the history of computing software come from which paradigm?

- A. imperative (or procedural)
- B. functional
- C. logic
- D. object-oriented

42. Which of the following language paradigms allows the programmer to express algorithms derived from a top-down design?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

43. Which of the following language paradigms is based on the mathematical concept of a function?

- A. imperative (procedural)
- B. functional
- C. logic
- D. imperative (object oriented)

44. LISP, Scheme, and ML belong to which language paradigm?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

45. Programs in which of the following paradigms have no assignment statements?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

46. Programs in which of the following paradigms use recursion to express repetition?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

47. In which of the language paradigms is the addition of two values expressed as (+10 20)?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

48. Which of the following paradigms is based on the mathematical concepts of symbolic logic?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

49. Which of the following paradigms is based on a set of facts about objects and rules about relationships among the objects?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

50. C++ is considered a procedural language with features from which other paradigm?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

51. Java is considered an object-oriented language with features from which other paradigm?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

52. A statement such as owns(mary,bo) comes from which paradigm?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

53. Which of the following is a language feature that enforces information hiding?

- A. encapsulation
- B. inheritance
- C. class
- D. polymorphism
- E. instantiation

54. Which of the following is a language construct that defines the pattern for an object?

- A. encapsulation
- B. inheritance
- C. class
- D. polymorphism
- E. instantiation

55. Which of the following allows one class to be derived from another?

- A. encapsulation
- B. inheritance
- C. object
- D. polymorphism
- E. instantiation

56. Which of the following is the process of creating an object from a class?

- A. encapsulation
- B. inheritance
- C. class polystation
- D. polymorphism
- E. instantiation

57. Which of the following allows a language to have duplicate method names and to apply the method that is appropriate for a particular object?

- A. encapsulation
- B. inheritance
- C. class
- D. polymorphism
- E. instantiation

58. Which of the following describes a key step in object-oriented programming

- A. isolating the classes within a problem
- B. preventing objects from communicating with one another by prohibiting the invoking of one another's subprograms

- C. removing superfluous data values and/or methods (subprograms) from a field
- D. deleting a named algorithm to prevent faulty manipulation in the object
- E. none of the above

59. Which of the following does NOT represent one of the four stages of the object-oriented design process?

- A. brainstorming
- B. filtering
- C. responsibility algorithms
- D. scenarios
- E. information hiding

60. All of the following characterize the imperative (procedural) paradigm for high level programming languages EXCEPT

- A. sequential execution of instructions
- B. use of variables to represent memory locations
- C. exemplified by the functional and the logic models of this paradigm
- D. the use of assignment statements that change the values of variables used in this paradigm.
- E. utilized by the dominant programming languages (BASIC, FORTRAN, C, C++, PASCAL) in the historical evolution of computer software

61. All of the following are considered simple or atomic data types EXCEPT:

- A. integers
- B. reals
- C. characters
- D. Booleans
- E. lists

Fill in the Blanks

62. A(n) _____ is a program that translates a high-level language program into machine code.

63. A(n) _____ is a program that translates and executes the statements of a high-level language in sequence.

64. Java programs are translated into a standard machine language called _____.

65. A(n) _____ is a model or pattern that establish a set of assumptions and practices.
66. The _____ programming paradigm is based on the mathematical concept of a function.
67. Lisp, Scheme, and ML are languages in the _____ programming paradigm.
68. Simula and Smalltalk were the first two languages in the _____ programming paradigm.
69. A(n) _____ expression is used as conditions in selection and repetition statements.
70. The requirement that only a value of the proper type can be stored into a variable is called _____.
71. A(n) _____ is a description of a set of values and the operations that can be applied to those values.
72. A(n) _____ is a statement that associates an identifier with a variable.
73. A(n) _____ is a word in a language that has special meaning and thus cannot be used as an identifier.
74. A(n) _____ is an instruction that determines the order in which other instructions in a program are executed.
75. An IF statement is an example of a _____ statement.
76. A WHILE statement is an example of a _____ statement.
77. A(n) _____ is the mechanism by which a value is passed into a subprogram.
78. A(n) _____ parameter accepts a copy of its argument.

79. A(n) _____ parameter accepts the address of its argument.
80. Clicking a mouse button is an example of _____ processing.
81. _____ is a language feature that enforces information hiding.
82. A(n) _____ is a language construct used to define the pattern from which an object is created.
83. Creating an object from a class is called _____.
84. _____ is an object-oriented mechanism in which one class is derived from another.
85. _____ is an object-oriented mechanism that allows duplicate method names and the ability to apply the method that is appropriate for a certain object.
86. A _____ is a sequence of characters that in some languages can be considered as one data value.
87. A Boolean expression evaluates to either _____ or _____.

Short Answer

88. What is Java Bytecode?
89. What is a Boolean variable?
90. What is a Boolean expression?

91.What is a data type?

92.What do we mean when we say a programming language is strongly typed?

93.Describe the integer data type as implemented in a particular programming language.

94.Describe the character data type as implemented in a particular programming language.

95.Describe the Boolean data type as implemented in a particular programming language.

96.What is an assignment statement?

97.What is a declaration?

98.What is a reserved word?

99.What does it mean for a language to be case sensitive?

100. What is a named constant?

101. What is a control structure?
102. What are parameters?
103. How did the invention of the mouse change programming?
104. Although Java, VB.NET, and C++ are quite different in many ways, they all access the fields of a record in the same way. Describe this syntax.
105. What is encapsulation?
106. What is inheritance?
107. What is polymorphism?
108. What is a reserved word and its purpose in high-level language programming?
109. What are the three parts of any input statement?
110. What are the items listed on the output statement and how are the values to be output processed?

111. Distinguish between imperative languages and declarative languages.

Essay

112. Distinguish between the portability provided by standard languages and the portability provided by interpretation by a virtual machine

113. We say that a record is passive, but a class is active. Explain.

114. Discuss the three primary features of an object-oriented programming language.

115. What role did Dutch computer scientist Edsger Dijkstra have in the development in high-level programming language design?

116. Should Internet gambling be outlawed or should it be regulated and/or taxed?

Answers and solutions

1. A compiler translates a high-level language program into the corresponding program in machine code.

Answer: True

2. An interpreter is a simulator that executes high-level language code directly.

Answer: True

3. A compiler and an interpreter both accept a program in a high-level language as input.

Answer: True

4. A compiler and an interpreter produce the same output.

Answer: False

5. Bytecode is a standard machine language into which Java source code is compiled.

Answer: True

6. The Java Virtual Machine is a hypothetical computer that executes Bytecode.

Answer: True

7. Boolean expressions are used to make decisions in a high-level language.

Answer: True

8. . Strong typing is a mechanism by which a high-level program is entered into a computer.

Answer: False

9. A variable declaration associates the variable name with a data.

Answer: True

10.. A declaration is an example of a control structure.

Answer: False

11.. An IF statement is an example of a control structure

Answer: True

12.. A parameter is a mechanism that allows data to be passed into a subprogram.

Answer: True

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13.True or False? Clicking a mouse is an example of asynchronous processing.

Answer: True

14.True or False? A loop can be nested within a selection statement, but a selection statement cannot be nested within a loop.

Answer: False

15.True or False? Encapsulation is a language feature that enforces information hiding.

Answer: True

16.. True or False? A class as a language construct is a pattern for an object.

Answer: True

17.True or False? Instantiation is the process of creating an object from a class.

Answer: True

18. True or False? Polymorphism is the ability of a language to have duplicate method names in an inheritance hierarchy and to apply the method that is appropriate for the object to which the method is applied.

Answer: True

19. True or False? Second generation high-level programming languages come in one of two varieties: those that are compiled such as COBOL and those that are interpreted like APL.

Answer: True

20. True or False? Two identifiers with the same spelling but different capitalization are considered to be the same identifiers in languages that are case sensitive.

Answer: False

21. True or False? In asynchronous processing, the processing is under the control of events occurring outside the sequence of processing instructions.

Answer: True

Multiple Choice

22. Which of the following translates a high-level language program into machine code?

- A. procedure
- B. interpreter
- C. Bytecode
- D. paradigm
- E. compiler

Answer: E

23. Which of the following translates and executes program statements in sequence, instead of having separate translation and execution steps?

- A. procedure
- B. interpreter
- C. Bytecode

- D. paradigm
- E. compiler

Answer: B

24. Which of the following is executed by the Java Virtual machine?

- A. procedure
- B. interpreter
- C. Bytecode
- D. paradigm
- E. compiler

Answer: C

25. Which of the following produces a true or false result?

- A. control structure
- B. strong typing
- C. data type
- D. Boolean expression
- E. declaration

Answer: D

26. Which of the following requires that only a value of the proper type can be stored into a variable?

- A. control structure
- B. strong typing
- C. data type
- D. Boolean expression
- E. declaration

Answer: B

27. Which of the following associates a variable name with its data type?

- A. control structure
- B. strong typing
- C. comment
- D. Boolean expression
- E. declaration

Answer: E

28. Which of the following include selection statements and repetition statements?

- A. control structure
- B. Strong typing
- C. data type
- D. Boolean expression
- E. declaration

Answer: A

29. Which of the following languages has an IF statement for making decisions?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

Answer: E

30. Which of the following languages uses Boolean expressions in their selection and repetition statements?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

Answer: E

31. Which of the following languages can be used to create an infinite loop?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

Answer: E

32. Which of the following languages does not require declarations?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

Answer: C

33. Which of the following languages uses indentions to indicate blocks of code?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

Answer: C

34. Which of the following languages uses the word then with the IF statement?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

Answer: C

35. Which of the following languages does NOT enclose the expression in a WHILE statement in parenthesis?

- A. Java
- B. C++
- C. Python
- D. VB.NET
- E. All of the above

Answer: C

36. Which of the following languages allow only value parameters?

- A. Java and C++
- B. C++ and VB.NET
- C. Python and Java
- D. VB.NET and Java
- E. All of the above

Answer: C

37. Which of the following is the ability for a subprogram to call itself?

- A. argument
- B. parameter
- C. recursion
- D. nested logic
- E. asynchronous processing

Answer: C

38. Which of the following allows a WHILE loop to be contained within the body of another while loop?

- A. subprogram
- B. parameter
- C. recursion
- D. nested logic
- E. asynchronous processing

Answer: D

39. Which of the following allows information to be passed into a subprogram?

- A. record
- B. parameter
- C. recursion
- D. nested logic
- E. asynchronous processing

Answer: B

40. Clicking a mouse button is an example of which of the following?

- A. subprogram
- B. parameter
- C. recursion
- D. nested logic
- E. asynchronous processing

Answer: E

41. The dominant languages used in industry throughout the history of computing software come from which paradigm?

- A. imperative (or procedural)
- B. functional
- C. logic
- D. object-oriented

Answer: A

42. Which of the following language paradigms allows the programmer to express algorithms derived from a top-down design?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: A

43. Which of the following language paradigms is based on the mathematical concept of a function?

- A. imperative (procedural)
- B. functional
- C. logic
- D. imperative (object oriented)

Answer: B

44. LISP, Scheme, and ML belong to which language paradigm?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: B

45. Programs in which of the following paradigms have no assignment statements?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: B

46. Programs in which of the following paradigms use recursion to express repetition?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: B

47. In which of the language paradigms is the addition of two values expressed as (+10 20)?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: B

48. Which of the following paradigms is based on the mathematical concepts of symbolic logic?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: C

49. Which of the following paradigms is based on a set of facts about objects and rules about relationships among the objects?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: C

50. C++ is considered a procedural language with features from which other paradigm?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: D

51. Java is considered an object-oriented language with features from which other paradigm?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: A

52. A statement such as `owns(mary,bo)` comes from which paradigm?

- A. procedural
- B. functional
- C. logic
- D. object-oriented

Answer: C

53. Which of the following is a language feature that enforces information hiding?

- A. encapsulation

- B. inheritance
- C. class
- D. polymorphism
- E. instantiation

Answer: A

54. Which of the following is a language construct that defines the pattern for an object?

- A. encapsulation
- B. inheritance
- C. class
- D. polymorphism
- E. instantiation

Answer: C

55. Which of the following allows one class to be derived from another?

- A. encapsulation
- B. inheritance
- C. object
- D. polymorphism
- E. instantiation

Answer: B

56. Which of the following is the process of creating an object from a class?

- A. encapsulation
- B. inheritance
- C. class polystation
- D. polymorphism
- E. instantiation

Answer: E

57. Which of the following allows a language to have duplicate method names and to apply the method that is appropriate for a particular object?

- A. encapsulation
- B. inheritance

- C. class
- D. polymorphism
- E. instantiation

Answer: D

58. Which of the following describes a key step in object-oriented programming

- A. isolating the classes within a problem
- B. preventing objects from communicating with one another by prohibiting the invoking of one another's subprograms
- C. removing superfluous data values and/or methods (subprograms) from a field
- D. deleting a named algorithm to prevent faulty manipulation in the object
- E. none of the above

Answer: A

59. Which of the following does NOT represent one of the four stages of the object-oriented design process?

- A. brainstorming
- B. filtering
- C. responsibility algorithms
- D. scenarios
- E. information hiding

Answer: E

60. All of the following characterize the imperative (procedural) paradigm for high level programming languages EXCEPT

- A. sequential execution of instructions
- B. use of variables to represent memory locations
- C. exemplified by the functional and the logic models of this paradigm
- D. the use of assignment statements that change the values of variables used in this paradigm.
- E. utilized by the dominant programming languages (BASIC, FORTRAN, C, C++, PASCAL) in the historical evolution of computer software

Answer: C

61. All of the following are considered simple or atomic data types EXCEPT:

- A. integers
- B. reals
- C. characters
- D. Booleans

E. lists

Answer: E

Fill in the Blank

62.A(n) _____ is a program that translates a high-level language program into machine code.

Answer: Compiler

63.A(n) _____ is a program that translates and executes the statements of a high-level language in sequence.

Answer: Interpreter

64.Java programs are translated into a standard machine language called _____.

Answer: Bytecode

65.A(n) _____ is a model or pattern that establish a set of assumptions and practices.

Answer: paradigm

66.The _____ programming paradigm is based on the mathematical concept of a function.

Answer: functional

67.Lisp, Scheme, and ML are languages in the _____ programming paradigm.

Answer: functional

68. Simula and Smalltalk were the first two languages in the _____ programming paradigm.

Answer: object-oriented

69. A(n) _____ expression is used as conditions in selection and repetition statements.

Answer: Boolean

70. The requirement that only a value of the proper type can be stored into a variable is called _____.

Answer: strong typing

71. A(n) _____ is a description of a set of values and the operations that can be applied to those values.

Answer: data type

72. A(n) _____ is a statement that associates an identifier with a variable.

Answer: declaration

73. A(n) _____ is a word in a language that has special meaning and thus cannot be used as an identifier.

Answer: reserved word

74. A(n) _____ is an instruction that determines the order in which other instructions in a program are executed.

Answer: control structure

75. An IF statement is an example of a _____ statement.

Answer: Selection

76. A WHILE statement is an example of a _____ statement.

Answer: Repetition

77. A(n) _____ is the mechanism by which a value is passed into a subprogram.

Answer: parameter (or argument)

78. A(n) _____ parameter accepts a copy of its argument.

Answer: Value

79. A(n) _____ parameter accepts the address of its argument.

Answer: Reference

80. Clicking a mouse button is an example of _____ processing.

Answer: Asynchronous

81. _____ is a language feature that enforces information hiding.

Answer: Encapsulation

82. A(n) _____ is a language construct used to define the pattern from which an object is created.

Answer: Class

83. Creating an object from a class is called _____.

Answer: Instantiation

84. _____ is an object-oriented mechanism in which one class is derived from another.

Answer: Inheritance

85. _____ is an object-oriented mechanism that allows duplicate method names and the ability to apply the method that is appropriate for a certain object.

Answer: Polymorphism

86. A _____ is a sequence of characters that in some languages can be considered as one data value.

Answer: string

87. A Boolean expression evaluates to either _____ or _____.

Answer: true; false

Short Answer

88. What is Java Bytecode?

Answer: The standard machine language into which Java source code is compiled, which is not machine language for any particular hardware processor.

89. What is a Boolean variable?

Answer: A location in memory, referenced by an identifier, which contain either true or false.

90. What is a Boolean expression?

Answer: A Boolean expression is a sequence of identifiers, separated by compatible operators, that evaluates to true or false.

91. What is a data type?

Answer: A description of the set of values and the basic set of operations that can be applied to those values.

92. What do we mean when we say a programming language is strongly typed?

Answer: It has a requirement that only a value of the proper type can be stored into a variable of that type.

93. Describe the integer data type as implemented in a particular programming language.

Answer: The set of values is made up of the range of integers that can be represented in the language, and the operations are the arithmetic operations addition, subtraction, multiplication, division, and remainder.

94. Describe the character data type as implemented in a particular programming language.

Answer: The set of values is made up of the characters listed in a particular character set such as ASCII or Unicode, and the operations are assignment and comparison.

95. Describe the Boolean data type as implemented in a particular programming language.

Answer: The set of values is made up of the constants true and false, and the operations are the Boolean operations AND, OR, and NOT.

96. What is an assignment statement?

Answer: A statement that stores the value of an expression into a variable.

97.What is a declaration?

Answer: A statement that associates an identifier with a variable, an action, or some other entity within a language that can be given a name so that the programmer can refer to that item by name.

98.What is a reserved word?

Answer: A word in a language that has special meaning; it cannot be used as an identifier.

99.What does it mean for a language to be case sensitive?

Answer: A case sensitive language distinguishes between upper and lower case letters in identifiers; thus NEXT, next, and NeXt are three different identifiers.

100. What is a named constant?

Answer: A location in memory, referenced by an identifier, which contains a data value that cannot be changed.

101. What is a control structure?

Answer: An instruction that determines the order in which other instructions in a program are executed.

102. What are parameters?

Answer: Identifiers listed in parentheses in a subprogram declaration that accept values passed in when the subprogram is called.

103. How did the invention of the mouse change programming?

Answer: It introduced the concept of asynchronous, or event-driven, processing.

104. Although Java, VB.NET, and C++ are quite different in many ways, they all access the fields of a record in the same way. Describe this syntax.

Answer: To access a field, you use the record name, dot, field name.

105. What is encapsulation?

Answer: The mechanism that enforces information hiding.

106. What is inheritance?

Answer: The object-oriented mechanism that allows one class to be derived from another; the parent class shares its declarations with the child class.

107. What is polymorphism?

Answer: The object-oriented mechanism that allows multiple methods to have the same name, with the ability to apply the correct definition based on the object used to invoke it.

108. What is a reserved word and its purpose in high-level language programming?

Answer: A reserved word is a work in a specific programming language that has a special meaning; it cannot be used as an identifier. For example Dim is a reserved word in the VB.NET language used to declare variables.

109. What are the three parts of any input statement?

Answer: The declaration of the variables into which data are to be placed; the input statement with the names of the variables to be read; the data stream itself.

110. What are the items listed on the output statement and how are the values to be output processed?

Answer: The items listed on the output statement can be literal values or variable names. Literal values are numbers or strings written explicitly in the output statement. The values to be output

are processed one at a time by looking at the type of the identifier or literal value. The type of the identifier or literal value determines how the bit pattern is to be interpreted.

111. Distinguish between imperative languages and declarative languages.

Answer: Imperative languages describe *how* a problem is to be solved; declarative languages describe the solution.

Essay

112. Distinguish between the portability provided by standard languages and the portability provided by interpretation by a virtual machine

Answer: Any program written in a standardized language can be run on any machine that has a compiler for that language. The program is compiled and run on each machine. A program in which the compiled version runs on a virtual machine can be run on any computer that has the virtual machine. The program is compiled once and the resulting virtual machine program is run on many machines. Thus, the program in a standardized language is compiled many times, but the program whose output is for a virtual machine need be compiled only once

113. We say that a record is passive, but a class is active. Explain.

Answer: Although records and classes are alike in many languages, they are used differently. A record usually contains only data and is passed as a parameter to be acted upon by some other code segment. A class, which defines an object, contains within it both data and the subprograms that manipulate that data. A record is acted upon by an external code segment, while a class contains within itself the constructs for its own manipulation.

114. Discuss the three primary features of an object-oriented programming language.

Answer: Encapsulation - A language feature that enforces information hiding. Inheritance - A language feature that allows a class to inherit the properties and behaviors of another class. Polymorphism - A language feature that allows duplicate subprogram names (method names in OO terminology) in an inheritance hierarchy and applies the method that is appropriate for the object to which it is applied.

115. What role did Dutch computer scientist Edsger Dijkstra have in the development in high-level programming language design?

Edsger Dijkstra was one of the central contributors to the development of ALGOL, a high-level

programming language that is renowned for its clarity and mathematical rigor. Dijkstra was a strong advocate of structured programming principles. He illustrated many of the problematic features of goto statements including their ability to make it difficult for colleagues to maintain programs containing frequent goto statements. Dijkstra encouraged the use of looping constructs that bracket the scope of branching in a program and usefully self-document the program. Dijkstra asserted that following these structured programming principles would facilitate the comprehension, maintenance, reliability of programs. His passionate defense of these structured programming principles as well as his seminal work in proofs of programming correctness made Dijkstra one of the most important contributors to the field of programming languages.

116. Should Internet gambling be outlawed or should it be regulated and/or taxed?

Advocates of banning all Internet gambling point to the issue and high possibility of fraud as a principal reason why it should be prohibited. Internet gamblers must provide their credit card information and Social Security numbers to open an account. Moreover, the design of the Internet sites makes it impossible for the Internet gambler to be confident that the games are being operated equitably. Internet gambling casinos, unlike traditional brick and mortar casinos, are either ineffectively or not at all regulated by states. Advocates of prohibiting all Internet gambling also claim that states are losing revenue to these Internet gambling sites since they are operated offshore and, thus, do not have to pay state taxes. These advocates point to federal legislation such as the 2006 Unlawful Gambling Enforcement Act as suggesting effective financial regulatory methods to establish and enforce a broad ban on Internet gambling.

Proponents of legalizing, regulating, and taxing Internet gambling point to the fact of its wide popularity, as Internet gambling earned revenues of \$5.9 billion from players in the United States and \$21 billion worldwide in 2008. They also argue that the offshore nature and technological features of the Internet make it all but impossible to establish and effectively enforce an all-encompassing ban on Internet gambling. These Internet gambling proponents further claim that by legalizing, regulating and taxing Internet gambling federal and state governments could curb the fraudulent Internet gambling operations and potentially capture a lucrative revenue source for their government coffers. In addition, they assert that most efforts to halt all Internet gambling have been unsuccessful, thus far, and will continue to fail as long as offshore operators of these gambling sites are able to maintain reliable Internet connections and can do business with overseas banks and other foreign financial institutions that can be accessed via the Internet.