## DSST
### Management Information Systems

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1. The standard code used for encoding text data into computer-readable numbers is called?

   (A) BCD  
   (B) EBCDIC  
   (C) ISO  
   (D) ASCII

2. Very high-speed memory that is used to duplicate data stored elsewhere so that it is more readily available to the processor is called?

   (A) Memory  
   (B) Cache  
   (C) Buffer  
   (D) Interface

3. Information with no context is called

   (A) knowledge.  
   (B) facts.  
   (C) data.  
   (D) intelligence.

4. Which of the following is the most memory?

   (A) A kilobyte  
   (B) A terabyte  
   (C) A megabyte  
   (D) A gigabyte
5. Which of the following refers to the sequential execution of a series of programs on a computer?

(A) Parallel processing  
(B) Transaction processing  
(C) Batch processing  
(D) Multi-processing

6. A reasonableness check would be performed in order to avoid entering

(A) the character “k” into a social security number field.  
(B) a misspelled name into a last name field.  
(C) a birth date over 100 years old into a day-of-birth field.  
(D) an entry of “green” into an eye-color field.

7. A computer program that translates from a low-level language to a higher level language is known as a

(A) compiler.  
(B) decompiler.  
(C) transcompiler.  
(D) cascader.

8. A system that exchanges only predefined data with its surroundings is called a(n)

(A) probabilistic system.  
(B) open system.  
(C) closed system.  
(D) relatively closed system.

9. What method CANNOT be used to decouple two subsystems?

(A) Slack capacity  
(B) Clustering  
(C) Flexible resources  
(D) A buffer
10. A system whose operation is completely predictable is called a(n)
   (A) probabilistic system.
   (B) artificial system.
   (C) open system.
   (D) deterministic system.

11. In order to create a just-in-time system, which of the following should be done?
   (A) All decoupling in the system must be avoided.
   (B) The system must be turned into a closed system.
   (C) The objectives of the system must be rethought.
   (D) Subsystems must be made more independent.

12. In analyzing a system, what two attributes should be foremost in guiding the changes to be made?
   (A) Constraints and integration
   (B) Interfaces and integration
   (C) Objectives and interfaces
   (D) Objectives and constraints

13. In an inventory tracking system, which of the following is NOT an input?
   (A) A list of items to be added to the inventory
   (B) A query about items in stock
   (C) A request to remove an item from stock
   (D) A list of items in low supply

14. Which of the following best describes the monitoring system of a nuclear power plant?
   (A) A human-machine system
   (B) An automated system
   (C) An autonomous system
   (D) A black-box system
15. Which of the following is a diachronic aspect of a system?

(A) The database  
(B) The ability to add new inputs  
(C) The original intention of the system  
(D) The response time of the system

16. Coupled subsystems

(A) influence one another.  
(B) are physically adjacent.  
(C) cannot communicate.  
(D) transmit data.

17. Which of the following is a back-channel communication?

(A) A customer support engineer mentions to the CIO that the bug-tracking system is broken.  
(B) A tester enters a new bug into the bug-tracking system.  
(C) The head of testing sends an e-mail to the CIO indicating the number of bugs currently being tracked.  
(D) The CIO calls a meeting with the programmers to discuss the number of unresolved bugs.

18. Which of the following has NOT been used as an input medium for computers?

(A) Keyboards  
(B) Punch cards  
(C) Pins  
(D) Paper tape

19. Determining the fundamental similarities between sets of data is called

(A) abstraction.  
(B) instantiation.  
(C) hypothesis.  
(D) compilation.
20. A program that is to run a time-sensitive application should be written in a language that is

(A) interpreted.
(B) compiled.
(C) compact.
(D) object-oriented.

21. What is the term for programs that can run under different operating systems on different computers?

(A) Binary executable
(B) Interoperable
(C) Platform independent
(D) Platform specific

22. Before object code can be run, it must be

(A) compiled.
(B) linked.
(C) edited.
(D) saved.

23. A compiler that outputs executable code for a system on which it does not run is called a

(A) cross compiler.
(B) cross assembler.
(C) virtual machine.
(D) transcompiler.

24. Memory that can be written to and is erased by exposing it to UV light is called

(A) EEPROM.
(B) ROM.
(C) EPROM.
(D) PROM.
25. Which of the following represents the smallest amount of memory?

(A) Cache  
(B) Register  
(C) Main memory  
(D) Hard disk drive

26. C belongs to which generation of computer languages?

(A) First  
(B) Second  
(C) Third  
(D) Fourth

27. Which of the following is NOT a part of the structure of an information system?

(A) Repository  
(B) Interface  
(C) Message  
(D) Channel

28. The number of different colors that can be displayed by a pixel in a system where each pixel is represented by 3 bytes

(A) is 256.  
(B) is 65,536.  
(C) is 16,777,216.  
(D) depends on the system.

29. At what system level would custom software most likely be in use?

(A) Individual  
(B) Workgroup  
(C) Enterprise  
(D) Interorganizational
30. Which of the following programs is used to send messages around the globe using the Internet?

(A) Microsoft Word  
(B) Microsoft Outlook  
(C) Microsoft Access  
(D) Microsoft Publisher

31. Which of the following network types would be best suited to a workgroup that is contained in the same building?

(A) WAN  
(B) LAN  
(C) MAN  
(D) CAN

32. Which of the following is the best format to electronically distribute documents outside an organization?

(A) DOC  
(B) PDF  
(C) TXT  
(D) WPS

33. ERP systems are usually implemented by

(A) a sysadmin.  
(B) an outside vendor.  
(C) an adhoc working group.  
(D) the CIO.

34. Under what circumstance would it be of great importance that each member of a workgroup use the same word-processing software?

(A) When members must read texts written by other members  
(B) When members must edit texts written by others  
(C) When texts are to be sent to users outside the workgroup  
(D) When users need to read texts downloaded from the Internet
35. Which of the following would be the best way for workgroups to keep in touch?

(A) Phone
(B) E-mail
(C) Teleconference
(D) Message board

36. Which of the following provides an open source replacement for the Microsoft Office suite?

(A) OpenOffice
(B) WordPerfect
(C) StarOffice
(D) SmartSuite

37. A specialized database that contains well-organized information about the operation of an organization plus the tools to store and retrieve this data is called which of the following?

(A) Configuration management
(B) Search engine
(C) Knowledge base
(D) Documentation

38. A system in which a transaction needs two or more processors to complete is called which of the following?

(A) Cooperative processing
(B) Interactive processing
(C) Parallel processing
(D) Dynamic processing

39. Which of the following would NOT be part of a groupware package?

(A) E-mail
(B) Data conferencing
(C) Spreadsheets
(D) Document management
40. Which of the following software products would most likely be used at the enterprise level of a company?

(A) Microsoft Excel  
(B) OpenOffice  
(C) Mozilla Firefox  
(D) SAP R/3

41. An interconnected set of data objects that allows for information storage and retrieval is called

(A) a data field.  
(B) a data model.  
(C) data storage.  
(D) data hierarchy.

42. A separate, internal table created by a database, containing a pointer to each entry in another table and sorted by an attribute other than the primary key of the other table, is called a(n)

(A) index.  
(B) schema.  
(C) query.  
(D) join.

43. The abstract model of the data to be stored in a database is called

(A) a record.  
(B) a transaction.  
(C) a schema.  
(D) DDL.

44. The “A” in ACID stands for

(A) Accuracy.  
(B) Adabas.  
(C) Access.  
(D) Atomicity.
45. Which of the following are correct SQL select statements?

I. SELECT * FROM table1 WHERE id < 100;
II. SELECT name FROM table1 WHERE id > 100
III. SELECT FROM table1 WHERE id < 100;

(A) I only
(B) II only
(C) I and III only
(D) I, II, and III

46. Adabas is what kind of database?

(A) Relational
(B) Network
(C) Hierarchical
(D) Object-Oriented

47. Embedded SQL allows you to write code in which of the following languages?

I. Java
II. COBOL
III. FORTRAN

(A) I only
(B) II only
(C) I and III only
(D) I, II, and III

48. In the network model of databases, a child can have how many parents?

(A) Exactly 1
(B) 1 or 2
(C) Exactly 2
(D) More than 1
49. Sending insecure data over the Internet in a secure way by encapsulating one protocol within another is called

(A) file sharing.
(B) encryption.
(C) tunneling.
(D) remote mounting.

50. Which of the following is a system for transporting large quantities of data over fiber optic systems where the parts of the network are almost synchronized?

(A) SONET
(B) SDH
(C) PDH
(D) ATM

51. A parity bit ensures that

(A) there is space between any two bytes transmitted.
(B) all transmission errors are caught.
(C) some transmission errors are caught.
(D) transmissions do not need to be repeated.

52. Which of the following network types allows a worldwide company to connect all of its subsidiaries together?

(A) WAN
(B) WLAN
(C) LAN
(D) MAN

53. Which of the following is NOT true about asynchronous transmission of data?

(A) The clocks of the sender and receiver must be in phase.
(B) The sender and receiver must be connected.
(C) It can be used to connect a computer to a printer.
(D) Data can flow in either direction.
54. The telephone system analog to the Internet is called

(A) PBX.
(B) PSTN.
(C) TCP/IP.
(D) ISDN.

55. A telephone exchange owned and used by a private company is called

(A) PSTN.
(B) VOIP.
(C) ISDN.
(D) PBX.

56. Noise in a communications channel that is created by communications in another data channel is referred to as

(A) static.
(B) information.
(C) crosstalk.
(D) transmission.

57. Which TCP port is the official primary HTTP access port?

(A) 20
(B) 8000
(C) 80
(D) 8080

58. The standard for sending e-mail across the Internet is called

(A) X.400.
(B) TCP/IP.
(C) SMTP.
(D) MIME.
59. In the address http://www.example.com, the top-level domain is which of the following?

   (A) com
   (B) example.com
   (C) http
   (D) www

60. Which of the following is an unencrypted terminal program to connect one computer to another?

   (A) SFTP
   (B) SSH
   (C) TELNET
   (D) IRC

61. The final step in the systems development life cycle is

   (A) installation.
   (B) implementation.
   (C) maintenance.
   (D) development.

62. Which of the following is a tool to allow automated testing of GUI-based programs?

   (A) NetBeans
   (B) WinRunner
   (C) Rational Rose
   (D) CVS

63. When designing a program using UML, the object model shows which information?

   (A) The relationship between the classes used by the system
   (B) The sequence of activities run by the system
   (C) The functions used by the end user of the system
   (D) The operational workflow of the system
64. Which of the following is the most widespread application used in end-user computing?

(A) Word-processing systems
(B) Spreadsheets
(C) Java
(D) Visual BASIC

65. In modeling languages, having one object contain another is called?

(A) Composition
(B) Aggregation
(C) Association
(D) Operation

66. Which of the following is a feature of agile software development but NOT of traditional software development methodologies?

(A) Analysis
(B) Iteration
(C) Implementation
(D) Development

67. Which of the following is the output of the design phase of a system’s life cycle?

(A) Documentation
(B) Specification
(C) Source code
(D) Requirements

68. Which of the following best describes integration testing?

(A) Tests individual pieces of software
(B) Tests the entire system at once
(C) Tests groups of software modules
(D) Tests each method of a module
69. In extreme programming, which of the following is written first?

(A) Unit testing code  
(B) Class code  
(C) Integration testing code  
(D) Documentation

70. Which of the following is NOT a problem with rapid prototyping?

(A) Managers think the prototype is the finished product.  
(B) Programmers reuse prototype code in the final product.  
(C) End-users’ needs are not met by the final product.  
(D) There’s too much emphasis on the GUI design and user interface.

71. What is the final step in decision making?

(A) Problem definition  
(B) Choice  
(C) Information evaluation  
(D) Information acquisition

72. Which of the following is the output of the systems design phase of the SDLC?

(A) Working code  
(B) Blueprint with specifications  
(C) Outline of information needs  
(D) System needs

73. Which of the following is NOT an advantage of iterative development?

(A) The final design of the product is available before coding begins.  
(B) Coders can get started on writing code as quickly as possible.  
(C) Estimates become more accurate as time progresses.  
(D) Changes that are necessary are easier to include.
74. CASE tools are most often used in which parts of the software development life cycle?

(A) Analysis and design
(B) Design and implementation
(C) Implementation and maintenance
(D) Investigation and analysis

75. Which of the following types of software are used in the management of multiple versions of the same software being developed by multiple programmers?

(A) Integrated development environments
(B) Revision control systems
(C) Cross-compilers
(D) Web browsers

76. The term for moving data from one system to another, newer system is called?

(A) Migration
(B) Reengineering
(C) Data extraction
(D) Data modeling

77. Which of the following are responsible for tactical and operational planning of management information systems?

(A) Users and system administrators
(B) Steering committee and MIS managers
(C) Chief information officer
(D) Chief executive officer

78. What is the main disadvantage of having software custom-written over buying off-the-shelf software?

(A) The software may not do what is needed.
(B) The initial costs are much higher.
(C) Software changes rapidly due to new releases.
(D) Feature-bloat makes the software run slow.
79. Producing a system by giving another company the specifications for the system for them to produce is called
(A) offshoring.
(B) outsourcing.
(C) inhousing.
(D) downsizing.

80. Making changes to an installed system to add new features is called which of the following?
(A) Perfective maintenance
(B) Adaptive maintenance
(C) Corrective maintenance
(D) System maintenance

81. Which of the following is NOT an objective of a data quality audit?
(A) To determine a quality measure of data
(B) To repair data found to be incorrect
(C) To document causes for bad data quality
(D) To create an assessment report

82. Which of the following levels of decision are addressed by management information systems?
I. Operational
II. Tactical
III. Strategic

(A) I only
(B) II only
(C) II and III only
(D) I, II, and III

83. Which of the following best describes Software as a Service?
(A) Software that performs a service
(B) Software that is accessible to the user over the network
(C) Software that is locally installed by a service provider
(D) Software that can be downloaded from a central server
84. Which of the following software packages is most likely to be employed for workflow management?

(A) Lotus Notes  
(B) Microsoft Exchange  
(C) Linux  
(D) Oracle database

85. Expert systems are used in cases where

(A) there is no single correct solution to a problem.  
(B) human input is not needed.  
(C) databases must be kept up-to-date.  
(D) data analysis is being made.

86. Knowledge work systems are most likely to be used for which of the following tasks?

(A) Managing a team of programmers  
(B) Programming a database system  
(C) Writing reports based on outside information  
(D) Deciding which application to install

87. When a system is being written that is to help codify a certain area of expertise, which of the following methods would most likely be employed?

(A) An expert system  
(B) A neural network  
(C) An artificial intelligence  
(D) A decision support system

88. A payroll system is a type of what system?

(A) DSS  
(B) EIS  
(C) CRM  
(D) TPS
89. A system that can handle large amounts of data and offer high standards of availability is called a(n)

(A) management information system.
(B) enterprise information system.
(C) decision support system.
(D) executive information system.

90. Which of the following metrics would be best used to ensure timely resolution of bugs?

(A) Number of bugs filed per day
(B) Number of bugs resolved per day
(C) Average time between filing and resolution of bugs
(D) Number of bugs filed per person

91. Executive information systems are generally considered to be a subtype of which class of systems?

(A) DSS
(B) CRM
(C) Expert systems
(D) TPS

92. Which of the following is NOT required for an electronic meeting system (EMS)?

(A) Networked computers
(B) A hands-free telephone
(C) A projection screen
(D) Software

93. Sensitivity analysis would most likely be used in which of the following systems?

(A) Decision support systems
(B) Electronic meeting systems
(C) Expert systems
(D) Transaction processing systems
94. Which of the following acts protects online service providers from being sued for content uploaded by their subscribers?

(A) DMCA  
(B) CDA  
(C) ECPA  
(D) COPPA

95. Which of the following is a secure protocol to transfer data to and from a Web browser?

(A) HTTP  
(B) SSH  
(C) HTTPS  
(D) FTP

96. At which point in the process is an edit check run against entered data?

(A) During processing  
(B) While entering data  
(C) Before processing  
(D) After processing

97. Preventing unauthorized access to computer data via authentication and encryption schemes is called

(A) software security.  
(B) logical computer security.  
(C) cryptography.  
(D) physical computer security.

98. Which of the following is a form of encryption created by the U.S. government for voice transmission?

(A) PGP  
(B) Clipper chip  
(C) RSA  
(D) DES
99. A policy to counter threats to computer security is called a

(A) threat.
(B) risk.
(C) countermeasure.
(D) vulnerability.

100. Which of the following acts places restrictions on the use of and disclosure of customer data?

(A) Communications Decency Act
(B) The Children’s Online Privacy Protection Act
(C) Telecommunications Act of 1996
(D) The Electronic Communications Privacy Act
1. **The correct answer is D.** ASCII is the American Standard Code for Information Interchange, and has become the standard way to represent text in computers, communications equipment, and other text-based devices.

2. **The correct answer is B.** A cache stores data so that they are available more quickly than if the data were to be retrieved from their original storage medium (which could be the main memory or the hard disk, or any other storage). Caches are used when the data are being repeatedly accessed, and the overhead from retrieving the data from the original medium is too high.

3. **The correct answer is C.** Though "information" and "data" are often treated as synonyms, information is data plus a context. Because of this, and to point out the difference, data are often also called "raw data."

4. **The correct answer is B.** Tera- is a prefix meaning "trillion." A terabyte is one trillion bytes. A gigabyte is one billion; a megabyte one million; and a kilobyte, one thousand bytes.

5. **The correct answer is C.** Batch processing refers to a process by which programs are queued up for processing. While each process is run, it has sole control over the computer. Batch processing was used extensively with early mainframes; most computers now have schedulers that keep any single process from monopolizing the CPU.

6. **The correct answer is A.** In running reasonableness checks on data entered, only such data that are provably wrong can be rejected. Since there is no way of determining how, exactly, someone spells their last name, there can be no check that determines whether it is spelled right or wrong. Social security numbers consist entirely of the numbers 0–9, plus the "-" character. Any other input should be rejected.

7. **The correct answer is B.** Decompilers take executable—or other low-level code—and reconstruct the high-level code that could have created the lower level code. Decompilers exist to help in recovering lost source code as well as aiding in computer security, interoperability, and error correction.

8. **The correct answer is D.** Open systems can take both predefined and unknown inputs. Closed systems have no input or output. Relatively closed systems allow only for well-defined inputs and outputs.

9. **The correct answer is B.** Clustering is a method used to bring multiple subsystems closer together, in order to simplify the interfaces between them. Slack capacity and buffering allow for greater processing from either the supplying or receiving subsystem without additional coordination. Flexible resources allow for last-minute changes.

10. **The correct answer is D.** A deterministic system is one in which the same output is generated every time, given the same input. A probabilistic system, in contrast, has outputs that vary from time to time, so it is impossible to predict which output will happen in a given run. Properly working software and hardware are examples of deterministic systems.

11. **The correct answer is A.** A just-in-time system is one in which decoupling has been removed as much as possible. There is no slack in the inventory or the productive resources. The subsystems are tightly integrated with one another.
12. The correct answer is D. In analyzing a system, the first objective should be to determine the objectives of the system (what the system is to do) and its constraints (what the parameters of the system are to be). Once these have been determined, the interfaces to other systems can be codified, while integration is the final step in implementing a system.

13. The correct answer is D. The inputs of a system consist of all pieces of information to be added to a system. This includes all queries, as well as data that will be physically included. Outputs are generated by the system. The list of items in short supply is an output from the system.

14. The correct answer is A. The monitoring of a nuclear power plant is a complex and dynamic system that requires both automatic and human responses. These types of systems are called human-machine systems.

15. The correct answer is B. The diachronic attributes of a system are those relating to a system's change or evolution. Allowing new inputs would be one of these attributes. Diachronic attributes should be considered in designing a system, to allow for change where it might be needed in the future.

16. The correct answer is A. The output of one coupled subsystem influences the input of the next subsystem. They do not have to be physically juxtaposed or transmit data directly, but do need to be able to communicate in some way.

17. The correct answer is A. The system described here has multiple channels of communication available to the users. The one that is not foreseen is a customer support engineer talking to the CIO. This is a back-channel communication.

18. The correct answer is C. Punch cards and paper tape were early input media for computers, keyboards were added soon thereafter and continue to be the most important method of inputting data into computers.

19. The correct answer is A. Abstraction is used in data modeling to determine the fundamental similarities between two sets of data. This helps generate a template for the data that can be programmed.

20. The correct answer is B. Compiled programs run more quickly than interpreted programs, as the conversion from human-readable code to machine-runnable code is done before the program executes. The size of the original code, or whether or not it is object-oriented, has no direct effect on the speed of execution.

21. The correct answer is C. Programs that can run under a variety of different operating systems and on different hardware platforms are called platform independent. Care must be taken that there are no platform-specific calls within the programs, even if the programming language being used is platform independent.

22. The correct answer is B. Object code is the output from a compiler. It is a compact representation of the source code and must be linked with other modules or libraries before it can actually be executed on a computer.

23. The correct answer is A. Cross compilers create executable code for systems under which they do not run. They are useful for writing code for machines that aren't powerful enough to run a compiler, as well as for allowing the same code to be compiled in order to run on multiple machines.
24. **The correct answer is C.** Erasable Programmable Read Only Memory is nonvolatile memory that can only be erased by exposing it to UV light. EPROM cannot be selectively erased, and can be erased and rewritten any number of times.

25. **The correct answer is B.** The registers in a CPU are very fast memory locations. They are used to briefly hold intermediate results of calculations. There are only a very limited number of registers in any CPU.

26. **The correct answer is C.** High-level languages such as C belong to the third generation of computer languages, succeeding machine languages and assembly languages. High-level languages allow a much greater abstraction from the internals of the computer being used.

27. **The correct answer is C.** Repositories, interfaces, and channels are all part of the physical structure of an information system. Messages are part of the behavior of the IS.

28. **The correct answer is C.** A system using 3 bytes, or 24 bits, per pixel can display $2^{24}$ different colors. $2^{24}$ is 16,777,216.

29. **The correct answer is C.** Writing software to be used by individuals or workgroups is usually not cost effective, while running software that others do not have access to makes the enterprise level the most likely place to use custom software. Software written for a single individual or workgroup usually does not pay for itself in time or manpower savings.

30. **The correct answer is B.** Microsoft Outlook is a tool that allows users to create, edit, send, and receive e-mail messages. Outlook passes these messages to an e-mail server that then transmits them via the Internet.

31. **The correct answer is B.** A workgroup is best connected with a local area network (LAN) that allows for high-speed transmission of data between geographically close computers. LANs do not require leased telecommunications devices, as all connections are locally owned and maintained.

32. **The correct answer is B.** When distributing documents, it is important that the document can be read by every user who needs to read it. Furthermore, PDF documents will appear exactly the same on every computer that displays them. Finally, third parties cannot easily modify PDF documents, so that errors cannot be added later by unauthorized users.

33. **The correct answer is B.** Since Enterprise Resource Planning (ERP) systems are extremely large and complex, they are usually implemented by outside vendors or consulting companies, who have experience in implementing such systems.

34. **The correct answer is B.** When editing documents is to be a collaborative effort, it is important that users have access to the same editing software. Although most word-processing software offers the possibility of exporting files in different formats, this often results in mangled documents that must first be reformatted before they can be properly edited.

35. **The correct answer is D.** A message board (also Internet forum) allows users to have online discussions that are available for all to see. Every user may start a discussion thread or add a comment to an existing
thread. There is a wide variety of software available to run this, and any Web browser can be used to access
the board.

36. The correct answer is A. OpenOffice is an open source, free version of the Microsoft Office suite. OpenOffice can import and export any Office file format, as well as a wide variety of other formats.

37. The correct answer is C. A knowledge base is a database containing such documents as white papers, manuals, articles, and troubleshooting guides that are used in an enterprise. They are carefully classified for easy retrieval and usually have a search engine for aiding in finding the needed document.

38. The correct answer is A. Cooperative processing is done in systems in which two or more processors are needed to complete a single transaction. The subsystems on the different computers need not be running simultaneously for the transaction to be completed.

39. The correct answer is C. Groupware consists of asynchronous communication tools (such as e-mail), synchronous communication tools (such as conferencing), and management tools (such as document management, workflow systems, and calendars). A spreadsheet might be used to create a document, but would not be considered part of the groupware system.

40. The correct answer is D. SAP R/3 is an Enterprise Resource Planning (ERP) system that can integrate and automate many of the processes used in a corporation. It is installed at the enterprise level in order to give it the maximum leverage in acquiring data.

41. The correct answer is D. A data hierarchy is a systematic organization of data in hierarchical form. The data is stored using parent-child relationships.

42. The correct answer is A. Data indices are created to help organize data for easier searching. Instead of having to search through every entry to find data entries with specific values in non-key attributes, the database system can use the index to find this data.

43. The correct answer is C. The schema of a database is the model of the data to be stored in the database. It is written in—and can be modified by—the data definition language (DDL).

44. The correct answer is D. Atomicity is the first of four rules that transactional databases must follow. It means that in each transaction, the transaction must either be completed in the database or the database must be returned to the state in which it was before the transaction began. A transaction is therefore atomic and indivisible.

45. The correct answer is A. An SQL select statement must end with a semicolon, and must contain either a list of fields or "*" to indicate which fields are to be returned. Only I has both of these, and is therefore a correct SQL statement.

46. The correct answer is C. Adabas is a hierarchical database and one of the first commercial database systems, released in the late 1970s. It continues to be used on a variety of systems due to its strong transactional capabilities, high reliability, and replication technologies.
47. The correct answer is D. Embedded SQL can be run from a large number of programming languages, called host languages. SQL has been embedded into most commonly used programming languages, including Java, COBOL, and FORTRAN.

48. The correct answer is D. The network model allows parents to have any number of children, and children to have any number of parents. This allows for extreme flexibility in storing data, but slows down searches.

49. The correct answer is C. Tunneling allows a user to send data securely through an insecure system—in this case, the Internet. An example is SSH tunneling used in Windows. By starting an SSH session, a user can remotely mount a file system without fear that someone else watching the traffic on the Internet can read the data. The data is encrypted at one end and decrypted at the other without the user having to do any further work.

50. The correct answer is C. Plesiochronous Digital Hierarchy (PDH) is a communications technology in which multiple streams of data are multiplexed together over a transport medium such as fiber optics. It is assumed that the data streams will have slightly different clock speeds, which the system can adjust for by signaling that bits are missing and will be ignored during demultiplexing.

51. The correct answer is C. Parity bits are simple tests to see whether the preceding data contains errors. However, if there are too many errors, a parity bit may not catch them. If an error has been found, the only way to fix the problem is to retransmit the data.

52. The correct answer is A. A wide area network (WAN) is a system for connecting geographically disparate computers together. The Internet is the best known WAN, and is used daily by companies with worldwide reach to communicate.

53. The correct answer is A. The chief advantage of asynchronous communication is that it is not necessary for the clocks of the sending and receiving systems to be synchronized. Data can be sent in either direction.

54. The correct answer is B. The public switched telephone network (PSTN) covers all the point-to-point telephone lines in the world, much as the Internet covers all the computers connected to that network.

55. The correct answer is D. Private branch exchanges (PBX) are privately owned and used telephone exchanges that can connect calls both within the company and externally. They allow companies to have greater control over their local phone system, often allowing for more functions than would be possible otherwise.

56. The correct answer is C. Crosstalk is the term used for communication from one channel leaking into another channel. On a telephone, this can often be heard as snippets of other conversations or other signals. In other communications systems, it adds noise to the signal, lowering the amount of signal that can be passed through the system.

57. The correct answer is C. IANA, and later ICANN, has a list of recommended ports to be used for specific protocols. HTTP has two ports assigned to it: the primary port is 80; the secondary (if a second HTTP server is running on the same machine) is 8080.
58. **The correct answer is C.** The Simple Mail Transfer Protocol (SMTP) has become the standard for sending e-mail across the Internet. It replaced X.400, which was much more complicated. SMTP is a simple, text-based protocol that can be easily implemented and tested.

59. **The correct answer is A.** The top-level domain is the last part of an Internet address, the part after the last dot; in this case, "com." The domains represented in an address get progressively more definitive from right to left, so the "com" represents the broadest area in which this address is located.

60. **The correct answer is C.** TELephone NETwork (TELNET) is a simple terminal emulator used to connect to another computer. Its main flaw is that it is unencrypted, and should therefore only be used on local networks or over secure networks.

61. **The correct answer is C.** The final step in the systems development life cycle is maintenance of the installed system. This is necessary to ensure that hardware problems and software bugs are found and corrected, and to ensure that the system evolves as needed in response to changing environmental factors.

62. **The correct answer is B.** WinRunner is a tool that allows the automated testing of GUI-based software. It can run through a suite of tests automatically, leaving testers to do finer tests that require real human input.

63. **The correct answer is A.** A UML object model shows the classes, with attributes and methods, and their relationships. It does not show what function the system has, or what the internal workflow is.

64. **The correct answer is B.** Spreadsheets are the most widely used applications in end-user computing. Creating a spreadsheet to solve a particular problem is a task best suited to the person (or group) that will actually be using the program.

65. **The correct answer is A.** Composition is the term for one object containing another. Aggregation is when one object contains a pointer to another object.

66. **The correct answer is B.** In traditional software development methods, there is a linear progression from analysis to maintenance. In agile development, this process is iterated over multiple times, with the end result of each iteration a running software system that includes slightly more functionality than that produced by the previous iteration.

67. **The correct answer is B.** The main output of the design phase is a series of specifications that describes how the system will be implemented. These specifications describe what is to be provided in later steps, and can be used to ensure that the final results match the original intentions.

68. **The correct answer is C.** Integration testing combines different modules that have been individually tested and tests them as one complete subsystem. Once all subsystems have been validated, the entire system can be subjected to system testing.

69. **The correct answer is A.** Writing test code before writing the code to pass these tests is called test-driven development and is used in extreme programming. The test code should follow closely the requirements of the final system, so that the tests are meaningful.
70. **The correct answer is C.** Since prototyping quickly offers a view to the user of what the final product will look like, the users get a better sense of what the product will—and will not—do. This facilitates communication with the programmers, and lessens the chance that the final product will not address the issues important to the users.

71. **The correct answer is B.** The four steps of decision making are: problem definition, information acquisition, information evaluation, and choice.

72. **The correct answer is B.** During systems design, the specifications—hardware, software, resources—for the final product are set down. The output should be a blueprint of specifications that describe the final system and give a road map to follow during coding of the system.

73. **The correct answer is A.** In iterative development methods, the final design is not available until shortly before the product is finished. The design is constantly being refined as the system is being created.

74. **The correct answer is A.** Computer-Aided Software Engineering (CASE) tools can be used in every aspect of software design, but are most often used during the analysis and design phase.

75. **The correct answer is B.** Revision control software is used to keep multiple versions of the same software stored so that multiple programmers can make changes without the changes affecting others. The system can also track the evolution of the code so that it can be determined what changes were made, when they were made, and by whom.

76. **The correct answer is A.** Migration is the technical term for extracting data from an old system, revising the data to fit the new system's data model, and entering the data into the new system.

77. **The correct answer is B.** Steering committees and MIS managers are responsible for ensuring that management information systems that are to be created and installed in a company are appropriate to the long-term goals of the company.

78. **The correct answer is B.** The advantage of custom software is that it does exactly what it is supposed to, with no extra features. The software also changes only as needed by the users. However, writing software is a very expensive proposition in both time and money and requires extensive testing before the software can be installed and used.

79. **The correct answer is B.** Outsourcing is giving any work formerly done in-house to another company. It requires sending out an exact specification for the work that is to be done.

80. **The correct answer is B.** System maintenance consists of three different types of maintenance. Adaptive maintenance changes the system by adding new features that become necessary as the needs of the company using the system change.

81. **The correct answer is B.** During the audit, no data are changed. Data are simply examined to make sure that they contain no errors, and recommendations are made to ensure that future additions to the data will be correct.
82. **The correct answer is D.** Management information systems support decision making on all levels: operational, tactical, and strategic. The information made available to managers can assist on any of these levels.

83. **The correct answer is B.** Software as a Service (SaaS) allows software to be run from a central server, rather than being locally installed. The plus is that there is no need for the user to keep track of versions of the software. If new versions are released, the central copies are updated and the user can access them thereafter.

84. **The correct answer is A.** Lotus Notes is client-server groupware that is used for workflow management. Although any software can be considered part of workflow management, groupware, such as Lotus Notes, is specifically designed for the task.

85. **The correct answer is A.** Expert systems apply rules to information inputted by the operator to find the most likely answers to a problem. The specific answers delivered by the system must then be analyzed by the operator to determine which is the correct answer.

86. **The correct answer is C.** Knowledge work systems are primarily used by knowledge workers, whose primary task is to work with information. They input information gleaned from many sources to create output that distills the information into a format others can use. Writing reports based on outside information would be a likely task.

87. **The correct answer is A.** An expert system has a limited field of expertise in which it operates. The questions it asks and the answers it seeks can only come from a set of rules covering a sharply delineated area of knowledge.

88. **The correct answer is D.** Transaction processing systems are systems that ensure that all transactions performed by them are done correctly. A payroll system is designed to run transactions related to people's money, so it must ensure that the transactions are completed properly.

89. **The correct answer is B.** Enterprise information systems refer to a class of systems that can handle the complete data output of an organization, while being available 24/7. Many types of management information systems can be enterprise information systems, but not all MIS are enterprise information systems.

90. **The correct answer is C.** Determining how long, on average, it takes to resolve a bug is an important measure in dealing with bugs. Reducing this average time ensures that customers with problems will have their problems solved quickly and makes for happier customers.

91. **The correct answer is A.** Executive information systems (EIS) are systems that organize data in a way that allows executives to make better, more informed opinions. As such, they are a subclass of decision support systems (DSS), which can be implemented at any level of a company.

92. **The correct answer is B.** Although EMS may be used in a distributed manner, this is not necessary. If the system is used locally, no telephone is needed.

93. **The correct answer is A.** Sensitivity analysis is the determination of what effect changes in inputs have
on the outputs of a process. In the business case, this allows managers to determine what costs have the most effect on profit. A decision support system would use this type of analysis to assist managers in their decisions.

94. The correct answer is B. The relevant section of the Communications Decency Act (CDA) reads: "No provider or user of an interactive computer service shall be treated as the publisher or speaker of any information provided by another information content provider." By not being treated as a publisher, the online service is not liable for anything that a user uploads, and therefore cannot be sued for information uploaded by a user.

95. The correct answer is C. HyperText Transfer Protocol Secure (HTTPS) is a protocol for sending data to and from a Web browser in a secure way. All data is encrypted before it is sent and decrypted at the other end.

96. The correct answer is C. Edit checks are tests run against the entered data after input has finished, but before processing begins, to make sure that there are no obvious errors in the data. This may be as simple as verifying that there are no non-numeric characters in input fields to running verifying checksums of data to comparing the sum total of data against known parameters to ensure they are legitimate.

97. The correct answer is B. Logical computer security involves the use of passwords and encryption to stop unauthorized access to computers via the Internet or other network.

98. The correct answer is B. The Clipper chip was developed and promoted by the U.S. government to encrypt telecommunications. It has been criticized because the algorithm used in the chip is classified, so that it cannot be tested for the quality of security it gives.

99. The correct answer is C. Countermeasures are policies or actions that seek to minimize the possibility of someone breaking into a computer system. Countermeasures can be both automated and manual, and they can protect from unauthorized access as well as from data loss due to external events, such as power outages.

100. The correct answer is C. Part of the Telecommunications Act of 1996 entitled "Privacy of Customer Information" states that telecommunications carriers have a duty to protect the confidentiality of data pertaining to customers. To achieve this, there are restrictions placed on the use and disclosure of certain customer information. The ECPA, in contrast, only disallows the dissemination of the content of communications.