Chapter 2: Database Design Fundamentals

TRUE/FALSE

1. The process of determining the particular tables and columns that will comprise a database is known as database design.

   ANS: T PTS: 1 REF: 23

2. A tabular database is a collection of tables.

   ANS: F PTS: 1 REF: 24

3. A relation is a characteristic or property of an entity.

   ANS: F PTS: 1 REF: 26

4. Because there is a one-to-many relationship between sales reps and customers in the Premiere Products database, one sales rep can be associated with zero, one, or more customers.

   ANS: T PTS: 1 REF: 26

5. In a relational database, each entity has its own table.

   ANS: T PTS: 1 REF: 26

6. A matrix is the association between entities.

   ANS: F PTS: 1 REF: 26

7. In the one-to-many type of relationship, the word many always indicates a large number.

   ANS: F PTS: 1 REF: 26

8. In a relational database, relationships are implemented by having common columns in two or more tables.

   ANS: T PTS: 1 REF: 27

9. Each column in a table of a relational database should have a distinct name.

   ANS: T PTS: 1 REF: 28

10. In a relation, all values in a column are values of the same attribute.

    ANS: T PTS: 1 REF: 28

11. A relation is essentially a three-dimensional table.

    ANS: F PTS: 1 REF: 28

12. Columns are sometimes called tuples.

ANS: F PTS: 1 REF: 28

13. The concept of functional dependence is trivial to understanding database concepts.

ANS: F PTS: 1 REF: 29

14. In a relation, the order of the rows and columns is immaterial.

ANS: T PTS: 1 REF: 28

15. The same column name can appear in two different tables in a relational database.

ANS: T PTS: 1 REF: 29

16. The statement “A sales rep’s pay class functionally determines his or her pay rate” means that if you know the pay class, you can determine the pay rate.

ANS: T PTS: 1 REF: 29

17. You can determine functional dependence by viewing sample data.

ANS: F PTS: 1 REF: 31

18. A secondary key is the unique identifier for a table.

ANS: F PTS: 1 REF: 31

19. A primary key always comprises a single column.

ANS: F PTS: 1 REF: 32

20. You can indicate a table’s primary key by underlining the column or collection of columns that comprises the primary key for each table in the database.

ANS: T PTS: 1 REF: 33

21. The definition for a primary key really defines a candidate key as well.

ANS: T PTS: 1 REF: 33

22. Many organizations and institutions are moving toward using Social Security numbers as primary keys because of privacy issues.

ANS: F PTS: 1 REF: 33

23. If a table contained both employee numbers and Social Security numbers, both columns would be referred to as candidate keys.

ANS: T PTS: 1 REF: 33

24. A programmer interviews users, examines existing and proposed documents, and examines organizational policies to determine exactly the type of data needs the database must support.

ANS: F PTS: 1 REF: 34

25. It is possible for the computer to generate values that are used as the primary key column.

ANS: T PTS: 1 REF: 34

26. Normalization is done before creating the database design.

ANS: F PTS: 1 REF: 41

27. An unnormalized relation is a relation that may contain repeating groups.

ANS: T PTS: 1 REF: 41

28. When you convert an unnormalized table to a table in first normal form, the primary key of the table in first normal form is usually the concatenation of at least two columns.

ANS: T PTS: 1 REF: 43

29. Qualification is an update anomaly.

ANS: F PTS: 1 REF: 44|45

30. A table is in third normal form if it is in second normal form and no nonkey column is dependent on only a portion of the primary key.

ANS: F PTS: 1 REF: 49

31. A determinant is any column (or collection of columns) that determines another table.

ANS: F PTS: 1 REF: 49

MULTIPLE CHOICE

1. The process of determining the particular tables and columns that will comprise a database is known as ____.
   a. normalization
   b. database design
   c. qualification
   d. relational management

   ANS: B PTS: 1 REF: 23

2. At Premiere Products, there is a ____ relationship between sales reps and customers.
   a. one-to-one
   b. one-to-two
   c. one-to-many
   d. many-to-many

   ANS: C PTS: 1 REF: 26

3. A(n) ____ is the association between entities.
   a. qualification
   b. functional dependency
   c. relationship
   d. join

   ANS: C PTS: 1 REF: 26

4. A(n) ____ is a characteristic or property of an entity.

a. field
b. attribute
c. column
d. All of the above

ANS: D PTS: 1 REF: 28

5. In a relational database each ____ should be unique.
a. row
b. record
c. tuple
d. All of the above

ANS: D PTS: 1 REF: 28

6. There is a commonly accepted shorthand representation to show the structure of a relational database: After the name of the table, all the columns in the table are listed within a set of ____.
a. square brackets
b. parentheses
c. back slashes
d. curly braces

ANS: B PTS: 1 REF: 28

7. A field is another term for a(n) ____.
a. tuple
b. row
c. column
d. entity

ANS: C PTS: 1 REF: 28

8. A record is another term for a(n) ____.
a. row
b. field
c. attribute
d. property

ANS: A PTS: 1 REF: 28

9. Which of the following symbols is used to qualify column names?
a. period (.)
b. comma (,)
c. backslash (/)
d. pound sign (#)

ANS: A PTS: 1 REF: 29

10. Which of the following is the primary key of the ORDER_LINE (<u>ORDER_NUM</u>, <u>PART_NUM</u>, NUM_ORDERED, QUOTED_PRICE) table?
a. <u>ORDER_NUM</u>
b. <u>PART_NUM</u>
c. QUOTED_PRICE
d. <u>ORDER_NUM</u> and <u>PART_NUM</u>

ANS: D PTS: 1 REF: 33

11. A relation is in ____ if it does not contain any repeating groups.
a. first normal form
b. second normal form
c. third normal form
d. Boyce-Codd normal form

ANS: A PTS: 1 REF: 41

12. ____ is the formal term for combining two or more columns to form a primary key.
a. Qualification
b. Joining
c. Normalization
d. Concatenation

ANS: D PTS: 1 REF: 43

13. ____ is the duplication of data.
a. Repeating group
c. Replication

b. Redundancy
d. Anomaly

ANS: B PTS: 1 REF: 44

14. ____ is one of the categories of update anomalies.
a. Functional dependence
c. Inconsistent data
b. Functional splitting
d. Qualification

ANS: C PTS: 1 REF: 44|45

15. A ____ column is a column that is not part of the primary key.
a. determinant
c. functional
b. candidate
d. nonkey

ANS: D PTS: 1 REF: 45

16. ____ can occur when there is a column in a table that is dependent on only a portion of the primary key.
a. Qualification
c. Function splitting
b. Update anomalies
d. Determination

ANS: B PTS: 1 REF: 45

17. Any column (or collection of columns) that determines another column is called a(n) ____.
a. nonkey column
c. dependency
b. primary key
d. determinant

ANS: D PTS: 1 REF: 49

18. In this text, Boyce-Codd normal form is the same as ____.
a. unnormalized
c. second normal form
b. first normal form
d. third normal form

ANS: D PTS: 1 REF: 49

19. In an entity-relationship (E-R) diagram, ____ are used to represent an entity.
a. rectangles
c. circles
b. ovals
d. diamonds

ANS: A PTS: 1 REF: 52

20. In an entity-relationship (E-R) diagram, one-to-many relationships between entitities are drawn as ____.
a. ovals
c. lines
b. equal signs
d. circles

ANS: C PTS: 1 REF: 52

COMPLETION

1. A(n) _____ is a person, place, thing, or event for which you want to store and process data.

ANS: entity

PTS: 1 REF: 26

2. A(n) _____ is the association between entities.

   ANS: relationship

   PTS: 1 REF: 26

3. A relationship is an association between _____.

   ANS: entities

   PTS: 1 REF: 26

4. A table's design should be as simple as possible; you should restrict each position in a table to a single entry by not allowing multiple entries (called a(n) _____ group) in an individual location in the table.

   ANS: repeating

   PTS: 1 REF: 27

5. A relational database is a collection of _____.

   ANS:
   relations
   tables

   PTS: 1 REF: 28

6. In a relation, the _____ of the rows and columns is immaterial.

   ANS: order

   PTS: 1 REF: 28

7. A(n) _____ is another name for a record or a row.

   ANS: tuple

   PTS: 1 REF: 28

8. When you combine a column name with a table name, you are said to _____ the column name.

   ANS: qualify

   PTS: 1 REF: 29

9. When you write a column in the format CUSTOMER.REP_NUM, you say that you _____ the column name.

   ANS: qualify

   PTS: 1 REF: 29

10. In a relational database, column B is _____ on another column A, if at any point in time a value for A determines a single value for B.

    ANS: functionally dependent

    PTS: 1 REF: 29

11. If B is functionally dependent on A, you also can say that A functionally _____ B.

    ANS: determines

    PTS: 1 REF: 30

12. The _____ key of a table (relation) is the column or collection of columns that uniquely identifies a given row in that table.

    ANS: primary

    PTS: 1 REF: 31|32

13. A relation is in _____ normal form if it does not contain any repeating groups.

    ANS:
    first
    1NF

    PTS: 1 REF: 41

14. The four categories of update anomalies are additions, deletions, inconsistent data, and _____.

    ANS: updates

    PTS: 1 REF: 44|45

15. A(n) _____ column is a column that is not part of the primary key.

    ANS: nonkey

    PTS: 1 REF: 45

16. If the primary key of a table contains only a single column, the table is automatically in _____ normal form.

    ANS: second

    PTS: 1 REF: 45

17. _____ is another name given to third normal form in this text.

    ANS:
    BCNF (Boyce-Codd normal form)
    Boyce-Codd normal form (BCNF)

Boyce-Codd
BCNF

PTS: 1 REF: 49

18. In one style of entity-relationship (E-R) diagrams, a crow's foot is used to represent the _____ side of a relationship.

ANS: many

PTS: 1 REF: 53

19. In one style of entity-relationship (E-R) diagrams, the letter n is used to represent the _____ side of a relationship.

ANS: many

PTS: 1 REF: 53

20. In one style of entity-relationship (E-R) diagrams, diamonds are used to describe _____.

ANS: relationships

PTS: 1 REF: 53

ESSAY

1. How does a DBMS that follows the relational model handle entities, attributes of entities, and relationships between entities?

ANS:
Entities and attributes are fairly simple. Each entity has its own table. The attributes of an entity become the columns in the table. In a relational model database a one-to-many relationship is represented by using common columns in two or more tables. More formally, a relation is essentially a two-dimensional table. Each column in a table should have a unique name, and entries within each column should all "match" this column name. Also, each row (also called a record or a tuple in some programs) should be unique. After all, if two rows in a table contain identical data, the second row doesn't provide any information that you don't already have. In addition, for maximum flexibility in manipulating data, the order in which columns and rows appear in a table should be immaterial. Finally, a table's design should be as simple as possible; you should restrict each position in a table to a single entry by not allowing multiple entries (called a repeating group) in an individual location in the table.

PTS: 1 REF: 26|27

2. Define a relation.

ANS:
A relation is a two-dimensional table in which:
1. The entries in the table are single-valued; that is, each location in the table contains a single entry.
2. Each column has a distinct name (technically called the attribute name).

3. All values in a column are values of the same attribute (that is, all entries must match the column name).
4. The order of columns is immaterial.
5. Each row is distinct.
6. The order of rows is immaterial.

PTS: 1 REF: 28

3. What is the precise definition of a primary key?

ANS:
Column A (or a collection of columns) is the primary key for a table if:
Property 1: All columns in the table are functionally dependent on A.
Property 2: No subcollection of the columns in A (assuming A is a collection of columns and not just a single column) also has property 1.

PTS: 1 REF: 32

4. What are the six steps necessary to design a database for a set of requirements?

ANS:
1. Read the requirements, identify the entities (objects) involved, and name the entities.
2. Identify the unique identifiers for the entities identified in step 1.
3. Identify the attributes for all the entities.
4. Identify the functional dependencies that exist among the attributes.
5. Use the functional dependencies to identify the tables by placing each attribute with the attribute or minimum combination of attributes on which it is functionally dependent.
6. Identify any relationships between tables.

PTS: 1 REF: 34|35