

Multiple Choice

1. Which of the following must be true of a table in First Normal Form (1NF)?
 - ☐ No non-key field is dependent upon another non-key field
 - ☐ There must be only one candidate key
 - ☐ All non-key fields are dependent upon the entire primary key
 - ☐ It has no repeating groups
 - ☐ It has no foreign keys
2. What part of the DBMS would one use to work with the database instance?
 - ☐ XML
 - ☐ DDL
 - ☐ DML
 - ☐ DCL
3. What portion of the DBMS would one use to make changes to the schema?
 - ☐ DML
 - ☐ DDL
 - ☐ HTML
 - ☐ DCL
 - ☐ XML
4. A tuple is
 - ☐ another name for a relationship
 - ☐ another name for a row in a relation
 - ☐ another name for a relation
 - ☐ none of these
 - ☐ another name for a column in a relation
5. The Entity Integrity Rules states:
 - ☐ the primary key must be unique and cannot be null
 - ☐ none of these
 - ☐ a foreign key is either null or is a primary key in some relation
 - ☐ all databases must have entities
6. An attribute or set of attributes within one relation that references a key of some other relation is a what?
 - ☐ super key
 - ☐ foreign key
 - ☐ skeleton key
 - ☐ primary key
 - ☐ none of these
 - ☐ candidate key
7. The set of allowed values for an attribute in a relational schema is called what?
 - ☐ none of these
 - ☐ degree
 - ☐ domain
 - ☐ range
 - ☐ superkey

- cardinality

ER Diagram

Draw an ER diagram for each of the following. Be sure to include as much of the relevant information as possible/

8. A department may supervise many other departments, but only has one directly supervising it, if any at all.
9. Rectangles, triangles, and pentagons are all types of polygons. They are not the only polygons that exist, but it is not possible for a polygon to be more than one of the listed types.
10. Exactly two teams come together to play in each game. Each pair of teams must play each other at least once.
11. Several players play for a team during a given period of time. Between one and three coaches will be coaching a team at any given time.

Short Answer

12. Assuming a relation is already in First Normal Form (1NF), what needs to be true for it to be in Second Normal Form (2NF) as well?

13. Assuming a relation is already in Second Normal Form (2NF), what needs to be true for it to be in Third Normal Form (3NF) as well?

Normalization

14. Answer the following questions using the relation provided. If you have to fix something in one of the questions, use the fixed version to answer the next question(s). Perform only the necessary fixes for each step.

$R(A, B, C, D, E, F, G(H, I, J, K, L))$

- $A \rightarrow B, C, D, E, F, G$
- $H \rightarrow I, J$
- $A, H \rightarrow K, L$
- $B \rightarrow C, D$

a. Is this relation in first normal form (1NF)? If not, write why and fix the problem below.

b. Is this relation in second normal form (2NF)? If not, write why and fix the problem below.

c. Is this relation in third normal form (3NF)? If not, write why and fix the problem below.

15. Do what is necessary to store the data from this relation in third normal form. Underline primary keys and circle foreign keys, drawing an arrow to the primary keys they reference.

R (A, B, C, D, E, F, G, H, I, J)

- $A \rightarrow J$
- $A, C \rightarrow B, D, E, F, G, H, I$
- $C \rightarrow E$
- $B \rightarrow G, H$
- $H \rightarrow I$

SQL

Construct an SQL statement to do each of the following:

16. Set up the table Person(ID, Name, Description). ID should be a number and the primary key. Name and Description will both be strings.
17. Add a row into the Person table with ID = 1, a name of “Thomas Riddle” and a Description of “Student”
18. Change the values of the attributes in Person for the entry you just added. Change the Name to “Lord Voldemort” and the Description to “Evil Wizard”. Do not assume that it is the only row in the table, and ensure that your query does not change any other rows
19. Show all the names in Person containing the string “rmion” anywhere in them. If there are duplicates, show them only once.
20. Show all of the names in Person ending in “er”. Also display the count of how many times each name that matched the pattern appeared.
21. Add a new column to Person called House, the purpose of which is to store the name of the house students get sorted into.

22. Change the value of House in the row corresponding to Lord Voldemort to “Slytherin”
23. Create a new table, Student, to hold specific data about the people who happen to be students. The primary key should be a foreign key into the People table, and it should have a new string attribute called Major.
24. Remove the entry that you had originally created for Thomas Riddle.
25. Get rid of the Person table completely.