系所組別：會計學系乙組
考試科目：資料庫管理系統　　　　　　　　　　　　　　　　　考試日期：0223，節次：1

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一　選擇題 (30%)

1.　Which of the following is *NOT* a property of relations?

a.　No two rows in a relation are identical

b.　Each attribute has a unique name

c.　The order in which the rows are listed in a relation is unimportant

d.　No two domains of attributes are identical

2.　Which of the following is used to express "relationships among relationships" in ER modeling?

a.　Specialization

b.　Generalization

c.　Aggregation

d.　None of the above

3.　In a relational database, a ＿＿＿＿＿ entity is an entity that cannot be uniquely identified by its attributes alone.

a.　Derived

b.　Weak

c.　Multi-valued

d.　None of the above

4.　What does the following SQL statement do?

　　Alter Table Student_T

　　　Add (Type Varchar(2))

a.　Alters the Student_T table to accept Type 2 Varchars.

b.　Alters the Student_T table to be a Type 2 Varchar.

c.　Alters the Student_T table by adding a 2-byte filed called "Varchar".

d.　Alters the Student_T table, and adds a row called "Type".

e.　None of the above

5.　＿＿＿＿＿ refers to the immunity of user applications to make changes in the definition and organization of data.

a.　Data independence

b.　Data striping

c.　Data integration

d.　Data segmentation

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6. When people describe Big Data, there are 4 Vs that are often used. Which one of the following is not one of them?

a.　Velocity

b.　Volume

c.　Variety

d.　Varsity

7. Which of the following relational operators is especially useful to express the following kinds of queries: Find the names of sailors who have reserved all boats?

a.　Union

b.　Join

c.　Division

d.　Selection

e.　Intersection

8. The number of fields in a relation is called relation _____.

a.　schema

b.　cardinality

c.　degree

d.　none of the above

9. Which of the following is NOT an advantage of a DBMS?

a.　data independence

b.　reduced application development time

c.　redundant data

d.　data integrity

e.　concurrent access

10. Most query optimizers represent query plans as a _____ of plan nodes.

a.　heap

b.　queue

c.　stack

d.　tree

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二 For each of the terms in the left-hand column below, select the term in the right-hand column that best matches it. (20%)

1. _____ Data modeling

A. A programming model for processing large data sets with a parallel, distributed algorithm on a cluster

2. _____ NoSQL

B. Used to represent a column value that is unknown or inapplicable

3. _____ MapReduce

C. SQL clause to eliminate duplicate values in query results

4. _____ ISA

D. Discretionary access control

5. _____ Having

E. A process used to define and analyze data requirements needed to support the business processes within the scope of corresponding information systems in organizations

6. _____ Null

F. Used to express the relationship of inheritance

7. _____ DISTINCT

G. SQL clause to specify qualifications over groups

8. _____ Grant and Revoke commands

H. Calculating closure of a set of FDs

9. _____ Armstrong's axioms

I. A database that provides a mechanism for storage and retrieval of data that is modeled in means other than the tabular relations used in relational databases.

10. _____ Create ASSERTION

J. Constraints over multiple relations

三 問答題

1. Given a relation R with 5 attributes ABCDE and the following functional dependencies：A→B, BC→E, and ED→A. Is A a candidate key of R? Show your steps for your answer.(5%)

2. Consider the following relation schemas:

Sailors(sid: integer, sname: string, rating: integer, age: real)

Boats(bid: integer, bname: string, color: string)

Reserves(sid: integer, bid: integer, day: date)

The key fields are underlined, and the domain of each field is listed after the field name. Write the following queries in **relational algebra.** (5% each)

a. Find the names of sailors who have reserved at least one boat.

b. Find the sids of sailors with age over 20 who have not reserved a red boat.

（背面仍有題目，請繼續作答）

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Write the following queries in **SQL.** (5% each)

a.　　Find the sids of sailors who have reserved a red boat.

b.　　Find the colors of boats reserved by Lubber.

3.　　Consider the following relation with ID as the primary key. Use it to answer the following questions.

Explain its problem of information redundancy, insert anomaly, update anomaly, and delete anomaly. (20%)

The relation has a functional dependency, dept_name -> building, budget. Is it in BCNF? If not, how do you make it so? (5%)

ID	name	salary	dept_name	building	budget
22222	Einstein	95000	Physics	Watson	70000
12121	Wu	90000	Finance	Painter	120000
32343	El Said	60000	History	Painter	50000
45565	Katz	75000	Comp. Sci.	Taylor	100000
98345	Kim	80000	Elec. Eng.	Taylor	85000
76766	Crick	72000	Biology	Watson	90000
10101	Srinivasan	65000	Comp. Sci.	Taylor	100000
58583	Califieri	62000	History	Painter	50000
83821	Brandt	92000	Comp. Sci.	Taylor	100000
15151	Mozart	40000	Music	Packard	80000
33456	Gold	87000	Physics	Watson	70000
76543	Singh	80000	Finance	Painter	120000