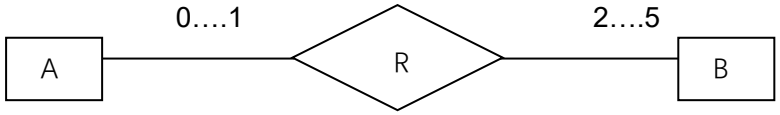
一、选择：

1. The following are functions of a DBMS except (　　)

(A)creating and processing forms　　(B)creating databases

(C)processing data　　(D)administrating databases

2. For the E-R diagram given below, the mapping cardinality from **A** to **B** is (　　)



(A) one-to-many　　(B) one-to-one　　(C) many-to-one　　(D) many-to-many

3. In a database system, which part is it to provide data consistency? (　　)

(A) the DBA　　(B) the user　　(C) the DBMS　　(D) the application program

4. To authorize query privilege of table s to database user Wang, and permit Wang to authorize the privilege to others, The SQL sentence is (　　) .

(A) GRANT　SELECT　TO　S　ON　Wang　WITH　PUBLIC　OPTION

(B) GRANT　SELECT　ON　S　TO　Wang　WIT H　PUBLIC　OPTION

(C) GRANT　SELECT　ON　Wang　TO　S　WITH　GRANT　OPTION

(D) GRANT　SELECT　ON　S　TO　Wang　WITH　GRANT　OPTION

5.SQL views can be used to hide:（　　）

(A)columns and rows only.

(B)complicated SQL syntax only.

(C) both of the above can be hidden by an SQL view.

(D) None of the above is correct

6. Which order of SQL clauses **EXECUTES** is correct? (　　)

A. SELECT-FROM-GROUP-WHERE-ORDER

B. FROM-SELECT-WHERE-GROUP-ORDER

C. FROM-WHERE-GROUP-SELECT-ORDER

D. SELECT-FROM-WHERE-GROUP-ORDER

7. A lossless join decomposition of a relation means: (　　)

A. none of the attributes are lost

B. no functional dependencies are lost

C. the natural join of the relations in the decomposition produces the original relation

D. no information of any kind is lost

8. Which of the following commands can be used to remove access privileges associated with a table? (　　)

A. DELETE B. REMOVE C. REVOKE D. DROP

9. If all candidate keys for a relation schema consist of only one attribute, the schema is satisfied at least ( )

A. 2NF B. 3NF C. BCNF D. 4NF

10. In levels of Consistency of Transaction in SQL-92, which is “only committed records to be read, and repeated reads of same record must return same value” ( )

A．READ UNCOMMITTED B．READ COMMITTED

C．REPEATABLE READ D．SERIALIZABLE

二、查询

Consider the relational database of a university research project with the following relation schemas, where the primary keys are underlined.

teacher(ID, name, dept_name)

project(ID, name, teacher_ID,budget)

student(ID, name, age, dept_name)

participate(student_ID,project_ID, salary)

Note: Each project has a teacher as a leader, represented by attribute teacher_ID.

1、 Give a relational algebra expression for each of the following queries:

(1) List the Ids and names of all projects whose leader is the teacher of the "Software" department.

(2)List the Ids and names of all members who have participated in the project named " AI" .

(3) List the IDs of all students who have taken more than five projects

(4) List the IDs and names of all students who have participated all projects that the student with ID "12345" has participated.

2、 Write SQL statements to perform the following commands:

(1)List Ids and names of all projects with a budget greater than 10,000 and with a name include "Software".

(2)List Ids and names of all student of "Software" department who have NOT participated in any project.

(3)List Ids and names of all projects and the number of students who have participated in it .Sort the results in descending order based on the number of students.

(4)List Ids of projects whose students earn a higher salary on average than the average salary at project with id '001'.

(5) List the names, sum salary of all students who have the most (highest) sum salary.

(6)List the names of all students who have participated in all projects led by the teacher whose name is 'Enstein';.

三、规范化

1. Consider the following relational schema:

project_material=(prjno, prjname, prjbudget, begindate, enddate, materialNo, materialName,materialquantity)

It contains information about the material usage of projects.

The Attribute prjno is the No. of project, The Attribute prjname is the name of project ,The Attribute prjbudget is the budget of project.

The Attribute materialquantity is quantities of materials used in a projerct.

- **Each project has unique project No.**
- **Different projects may have same project name, project budget, project begindate and project enddate.**
- **Each project use various materials.**

The following is an instance of the schema:

prjNo	prjName	prjBudget	begindate	enddate	Material No	Material Name	Material quantity
101	1# project	10000	2020/01/01	2021/01/01	10001	Cement	100
101	1# project	10000	2020/01/01	2021/01/01	10002	Steel	120
101	1# project	10000	2020/01/01	2021/01/01	10003	Sand	120
102	2# project	20000	2020/09/01	2021/07/01	10001	Cement	100
102	2# project	20000	2020/09/01	2021/07/01	10003	Sand	110
103	1# project	10000	2020/01/01	2021/01/01	10001	Cement	100

(1) **Based on above, Identify functional dependencies of *project_material*.**

(2) Based on above, Identify the **candidate key(s)** of **project_material**.

(3) Is the relation schema **project_material**in **BCNF**? Why? Is it in **3NF**? Why? If it is not in 3NF, bring it to a set of relations at least in 3NF; specify primary keys and referential integrity constraints for each relation.

2.Consider a relation R(A,B,C,D,E,G) with the set of Functional Dependencies

F={BE→G, BD→G, CD→A, CE→G, CDE→AB, BC→A, B→D}

(1) Give all candidate keys of R. [3 points]

(2) Give a canonical cover of F.

四、并发控制

Consider the concurrent schedule of transactions T1 and T2.

T1	T2
read (A)	
A=A+1	
	read (B)
write(A)	
	B=B-1
read(B)	
	write(B)
B=B+1	
	read(C)
write(B)	
	C=C+2
	write(C)
	Commit
Commit	

1. Is the schedule conflict serializable? If so, give an equivalent serial schedule. If not, give an explain briefly. **(5 points)**
2. Add lock and unlock instructions to Transactions T1 and T2， only consider the 2PL concurrent schedule of transactions T1 and T2, observe the two-phase-locking protocol ,Can it results in a deadlock? **(5 points)**

五、数据库设计

For a simplified application on Supermarket Management, there are three entity sets: **Supermarket**, **Product**, and **Warehouse**.

The attributes of Supermarket includes: SupermarketNo, SMName, SMAddress, Telephone, Manager; and the attributes of Product contains: ProductNo, PName, Price, Producer, ProduceDate; and the attributes of Warehouse contains: WarehouseNo, WarehouseName, WAddress, Adminstrator.

And two relationship sets: Supermarket and Product related through a binary relationship set Sale, Supermarket sales products ,record the product's sale quantities every day ;

and Product and Warehouse related through a binary relationship set Stock. **The warehouse only input(store) each product once a day. The supermarket can sale only each product once a day.**

The two relationship sets have the following attributes respectively: Sale has attributes: SaleDate and SaleQuantity; Stock has attributes: InDate, InPrice, and StockQuantity.

1. Please give the corresponding ER diagram. (8 points)
2. Create the corresponding relational schemas, and point out the primary keys and the foreign keys. (8 points)

3. Use SQL statements to define Product table, and give proper integrity constraints.(4 points)