CS585
Database Systems
Summer 2009
Midterm Exam

Name: _____

Student ID: _____

	Maximum	Received
Problem 1	20	
Problem 2	16	
Problem 3	15	
Problem 4	9	
Problem 5	26	
Problem 6	14	
Total	100	

2 hour exam
One 8.5x11 one-sided cheat sheet allowed

1) 20 pts

Indicate whether each of the following statements is true or false (T/F):

___Conceptual schema describes how users see the data.

___Completeness Constraint is a constraint on specialization.

___Any candidate key of a relation is a super key for that relation.

___All attributes of a relation together form a super key for the relation.

___The default policy for the foreign-key constraint sets the value of a foreign-key to null when the tuple of its referenced attribute gets deleted .

___The expression "(0 != NULL)" in the WHERE clause of a SQL query is evaluated to be true.

___The key of a weak entity always contains the key of its parent entity.

___A composite attribute contains one or more single valued attributes.

___Superclass has all the attributes of its subclasses.

___The expression (Student.Age >= 8) used in a WHERE clause will evaluate to "TRUE" if the Age attribute happens to be NULL.

___ The expression (Student.Age < 8) used in a WHERE clause will evaluate to "FALSE" if the Age attribute happens to be NULL.

___Stored procedures help improve the efficiency of the database application because they compute the results and store it only once during the execution of the application.

___JDBC has the advantage that it could make an application database independent.

___In an ORDBMS every object type has a constructor method implicitly defined by the system to instantiate an object.

___In an ORDBMS every object type has a map method implicitly defined by the system to allow for comparison operations.

___All equivalent SQL queries will have the same performance characteristics on a given DBMS

___A table constraint in SQL can reference more than one table

___An assertion in SQL can reference more than one table

___Dynamic SQL provides a mechanism to create applications that are not database specific

___SQLJ and embedded SQL enforce the same set of SQL standards

2) 16 pts

Draw an EER diagram to model the application with the following assumptions. Show the primary keys and the relationships (1-1, 1-m and m-m)

Design a database for a banking system, which maintains information about customers and their accounts

- Each customer has a name, a permanent address, and a social security number.

- Each customer can have multiple phone numbers, and the same phone number may be shared by multiple customers.
- A customer can own multiple accounts, but each account is owned by a single customer.
- Each account has an account number, a type (such as saving, checking, etc), and a balance.
- The bank issues an account statement for each account and mails it to its account owner every month. As time goes on, there will be multiple statements of the same account.
- Each statement has an issued date and a statement ID. All the statements of the same account have different statement IDs, but two different accounts could have statements with the same statement ID. For example, it is possible that account A has a statement with ID `123', while account B has another statement with the same ID `123'.
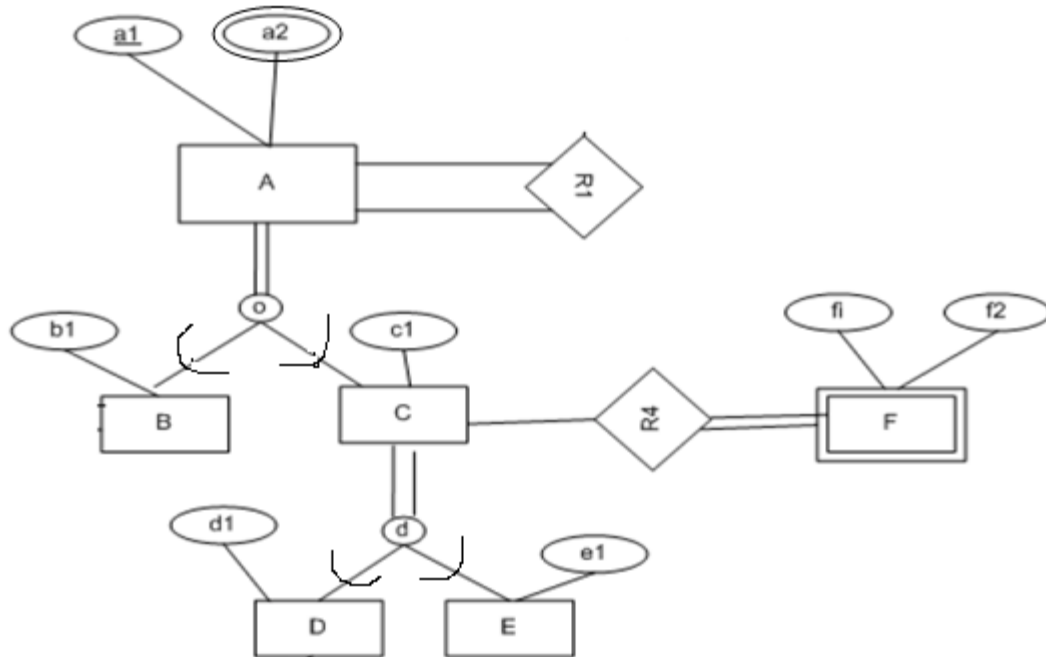
If you need additional assumptions to complete your diagram, please state your assumptions here as well
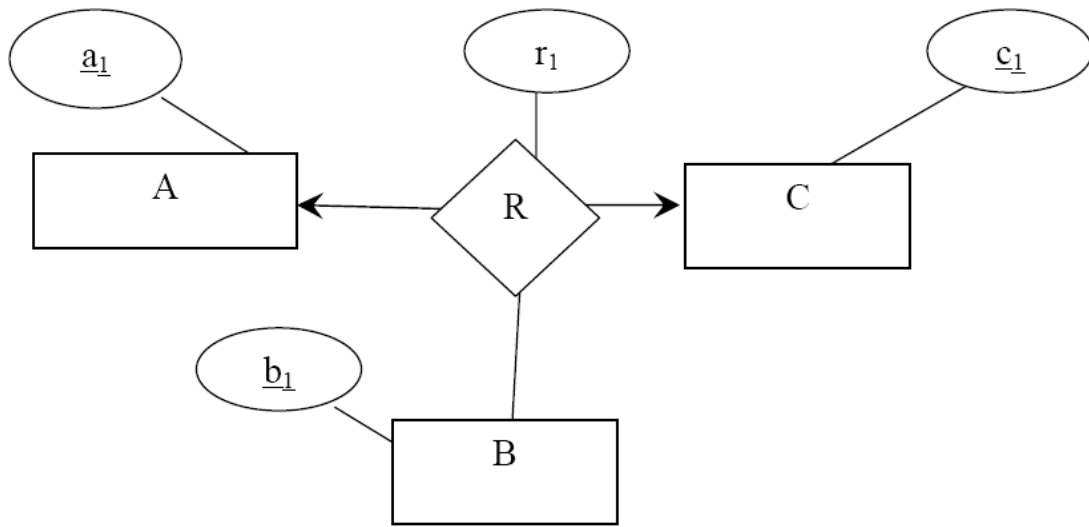
Additional space for problem #2

3) 15 pts (a-10, b-5)
Reduce the given EER / ER diagrams to relations using pure relational model (i.e., No
Object Oriented or Object Relational). Be sure to identify all primary and foreign keys.

a)

b)

4) 9 pts
Given each of the 3 scenarios below, which of the following database integration technologies will you NOT use in each case. Explain why
Technologies: JDBC, Embedded SQL, SQLJ, dynamic SQL, stored procedures

A) Application relies on specific SQL features of the Oracle database.

B) Query speed is essential to the success of our application.

C) We must deliver a single executable for our application that can work with Oracle, Sybase, and IBM databases.

5) 26 pts

Consider the relations given in the below tables. Write down the following queries in SQL. You do not have to worry about duplicate tuples in the output relations of your queries.

StoreID	StoreName
1	Kmart
2	Walmart
3	Safeway
4	Meijer
5	RiteAid
6	Xmart
7	Ymart

Table 1: Store relation

ProductName	StoreId
Bread	2
Cheese-Cheddar	4
Cheese-Feta	5
Cheese-Livarot	7
Cheese-Mozarella	4
Cucumber	1
Lettuce	4
Onion	1
Potato	5
Tomato	3
Tuna	5
Yam	3

Table 3: Inventory relation

ProductName	UnitPrice
Bread	1.6
Cheese-Cheddar	2
Cheese-Feta	4
Cheese-Livarot	9
Cheese-Mozarella	5
Cucumber	4
Lettuce	1
Onion	2
Potato	2.5
Tomato	2.1
Tuna	0.5
Yam	4

Table 2: Product relation

(a) Return the names of the stores that have Tomato and Lettuce in their inventories. (5pts)

(b) Return the names of the products whose unit prices are below the average unit price of all the products.(5 pts)

(c) Each store has an average unit price. It is the average of the unit prices of the products available at the store. Return the average unit prices of all stores. Your query should produce pairs of store names and their average unit prices.(8pts)

(d) Return the product(s) that are available in at least three stores.(8pts)

6) 14 pts
Describe the following concepts in a few sentences

    a- Referential integrity --give example (4pts)

    b- Domain constraints --give example (4pts)

c- Cardinality Constraints (3pts)

d- Generalization (3pts)