

Student name: _____ Student ID: _____

General Guidelines: Exam duration: 70 min; closed book, and no collaboration. All questions need to be answered. Use the spaces after the questions in this set of pages for your answers (additional pages may be used- write your name and id on them - but should not be necessary). Marked exams will be available on Oct 31 (in class). Deadline date for appeals is Nov 7 at 5 pm.

Question 1 (9 points) In one database class in a far away University the instructor asked three students to draw an ER model for the following part of a larger scenario:

“... each part has a unique identifier, costs a fixed amount, according to a table to which all suppliers subscribe, and it is made by one supplier. Each supplier on the other hand may produce several different parts ...”

The students produced the diagrams shown below. For each of them point out what is wrong, if anything, and how to correct it (Note: if you feel the diagram(s) is (are) correct, say so, no comments will be considered an incorrect answer).

DIAGRAM 1:

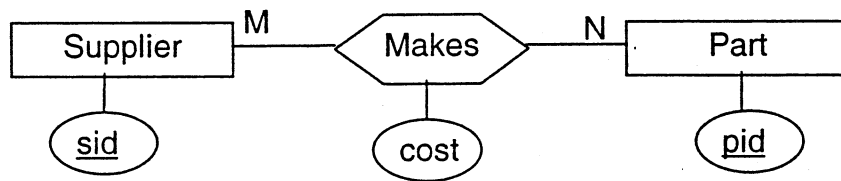


DIAGRAM 2:

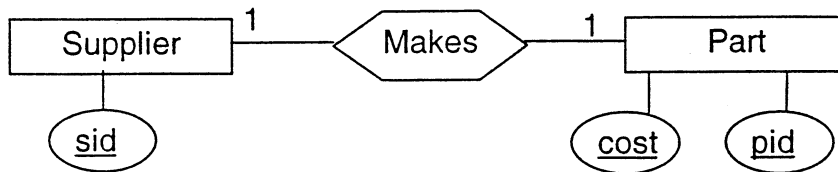
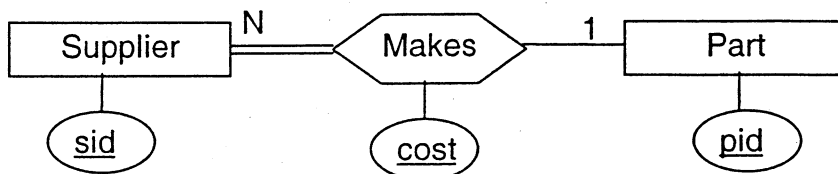


DIAGRAM 3:



E
 05171
 CMPUT 291 (A2)
 NASCIMENTO, M.
 OCT 00 MIDTERM
 PAGES: 6

Student name: _____ Student ID: _____

Question 2 (21 points) Consider the following scenario in a software engineering company: *Each engineer is contracted to work in only one project at a time, earning a given fixed salary per contract. Each contract lasts exactly one year and each project may have several engineers dedicated to it. However, each engineer may work in the same project more than once, provided that there is no conflict with the previous requirements.* For example, the following relation instance is possible:

Mario works at project P1 during 1998

Mario works at project P1 during 1999

Anna works at project P2 during 1999

Mario works at project P1 during 2001

Show the ER model for the scenario above, as well as the relations in the corresponding relational model. You should assume that every engineer is identified by a unique Eid and each project is identified by a unique Pid.

Student name: _____ Student ID: _____

Question 3 (20 Points) Consider the following relation instances:

Branch

<u>branchName</u>	<u>branchCity</u>	<u>assets</u>
Downtown	Brooklyn	900,000
Redwood	Palo Alto	210,000
Mianus	Horseneck	400,000
Round Hill	Horseneck	8,000,000
Brighton	Brooklyn	700,000

Customer

<u>customerName</u>	<u>customerStreet</u>	<u>customerCity</u>
Jones	Main	Palo Alto
Adams	Spring	Pittsfield
Green	Horseneck	Palo Alto
Williams	Nassau	Horseneck

Loan

<u>branchName</u>	<u>loanNumber</u>	<u>amount</u>
Downtown	L17	1,000
Round Hill	L14	1,500
Mianus	L18	2,000

Borrower

<u>customerName</u>	<u>loanNumber</u>
Jones	L17
Green	L17
Adams	L14
Williams	L18

Show the answers yielded by the following SQL queries:

- a)

```
SELECT branchName, count (*)
FROM Borrower B, Loan L
WHERE B.loanNumber = L.loanNumber
GROUP BY branchName
```
- b)

```
SELECT branchName, avg (assets)
FROM Branch
GROUP BY branchCity
HAVING MIN(assets) < 500,000
```

Student name: _____ Student ID: _____

- c) `SELECT customerName
FROM Loan, Borrower, Customer
WHERE Loan.loanNumber = Borrower.loanNumber AND
Borrower.customerName = Customer.customerName AND
amount > (SELECT AVG(amount) FROM Loan)`
- d) `SELECT DISTINCT A.customerName, B.customerName
FROM Borrower A, Borrower B
WHERE A.loanNumber = B.loanNumber`

Question 4 (36 Points) Using the same schema for those relations in Question 3, write the SQL statements for the following queries:

a) Which branches have no customer ?

b) Who are the customers who have more than one loan ?

Student name: _____ Student ID: _____

Question 7 (7 Points) Using the same schema for those relations in Question 3, CHOOSE ONE OF THE FOLLOWING TWO QUERIES and write it using relational algebra:

a) Which branches have no loans ?

b) Which customers live in the same city where the Redwood branch is located ?

Question 8 (7 Points) CHOOSE ONE OF THE FOLLOWING TWO QUESTIONS and answer it in a succinct and direct manner

a) What are integrity constraints, and how do they relate to foreign key constraints ?

b) Discuss the following statement (from the textbook): "... a DBMS provides the user with data independence ...".