

CSC 343H1 S 2010 Test 2
Duration — 45 minutes
Aids allowed: none

Student Number:

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Last Name: _____ First Name: _____

Lecture Section: Tuesday evening

Instructor: Horton

*Do **not** turn this page until you have received the signal to start.*
(Please fill out the identification section above, **write your name on the back of the test**, and read the instructions below.)

This midterm consists of 5 questions on 9 pages (including this one). *When you receive the signal to start, please make sure that your copy is complete.*
If you use any space for rough work, indicate clearly what you want marked.

1: _____/ 8

2: _____/ 4

3: _____/10

4: _____/ 6

5: _____/ 8

TOTAL: _____/36

Question 1. [8 MARKS]

Consider the following database.

	<table><tr><td>A</td><td>B</td></tr><tr><td>1</td><td>2</td></tr><tr><td>3</td><td>4</td></tr><tr><td>1</td><td>3</td></tr></table>	A	B	1	2	3	4	1	3	
A	B									
1	2									
3	4									
1	3									
R :										

	<table><tr><td>B</td><td>C</td></tr><tr><td>1</td><td>3</td></tr><tr><td>2</td><td>4</td></tr></table>	B	C	1	3	2	4	
B	C							
1	3							
2	4							
S :								

	<table><tr><td>B</td><td>C</td></tr><tr><td>2</td><td>5</td></tr><tr><td>2</td><td>3</td></tr><tr><td>2</td><td>4</td></tr></table>	B	C	2	5	2	3	2	4	
B	C									
2	5									
2	3									
2	4									
T :										

Give the results (schema and data) produced by each of the following queries.

Part (a) [2 MARKS]

```
(select R1.A from R R1, R R2 where R1.B <= R2.B)
  intersect all
(select A from R, T where R.B <> 3);
```

Part (b) [2 MARKS]

```
select *
from R, S
where C = any (select C from S natural join T);
```

Part (c) [2 MARKS]

```
select S.B, avg(T.C)
from (S full outer join T on S.B = T.B)
group by S.B;
```

Part (d) [2 MARKS]

```
select R.A
from R, S
where not exists
    (select * from T where T.B = S.B);
```

Marking: no partial credit

Question 2. [4 MARKS]

Consider the following relation instance for Results.

Name	Course	Grade
Johan	CSC309	85
Johan	CSC454	95
Ari	CSC454	67
Vince	CSC108	78
Jiaqi	CSC309	85
Zoya	CSC309	72
Fred	CSC148	82
Ming	CSC207	70
Elaine	CSC309	73
Fred	CSC207	68
Vince	CSC207	68

Part (a) [2 MARKS]

Compute the result of this query on the instance above. Make sure it is clear what is your final answer.

```

select Name from
  (select Course, min(Grade) as X from Results group by Course) as Temp
  natural join Results
where Results.Grade = Temp.X
group by Name
having count(*) > 1;

```

Part (b) [2 MARKS]

Compute the result of this query on the instance above. Make sure it is clear what is your final answer.

```
create view Enrolments as
  (select Course, count(Crade)
   from Results
   group by Course);

select *
from Enrolments
where Enrolments.count >
  (select avg(Count) from Enrolments);
```

Marking: no partial points

Question 3. [10 MARKS]

Write the queries below in SQL, for the following relational schema. (It is slightly modified from what we saw on Test 1: appointments have a date, but no time.) Keys are underlined and the following inclusion dependencies hold: $\text{Appointments}[\text{CID}] \subseteq \text{Clients}[\text{CID}]$, and $\text{Appointments}[\text{SID}] \subseteq \text{Staff}[\text{SID}]$.

Clients(CID, name, phone).

Staff(SID, name).

Appointments(CID, date, service, SID)

Part (a) [5 MARKS]

Find the CID of the client who had staff member Giuliano's first appointment, that is, the appointment with the lowest value for date. For simplicity, assume that date has been defined with domain `int`.

Marking: Start with 5 marks and deduct one for each step that is missing or wrong.

- Get Giuliano's appointments (deduct up to three for these sub-steps):
 - Join Appointments to Staff to get access to staff names.
(Okay to save this in a view or “recalculate” it more than once.)
 - Make sure SIDs match.
 - Reduce to just appointments with Giuliano.
- Find the minimum date among them.
- Among all appointments with Giuliano, ...
- ... find the one (or more) with that minimum date.
- Reduce to just the CID column.

Total number of possible deductions is 7. Minimum mark is zero.

Part (b) [5 MARKS]

For every client, return their CID and the number of appointments they have had with Giuliano. Be sure to include even client's who have had no appointments with Giuliano.

Marking: Start with 5 marks and deduct one for each step that is missing or wrong.

- Solve the problem for people who did have at least one appointment with Giuliano (deduct up to four for these sub-steps):
 - Get Giuliano's appointments as above.
 - Group by CIDs.
 - Count the number of appointments (this will then be per CID).
 - Select CID and number of appointments. I don't care what they name the count column.
- Solve the problem for people who had no appointment with Giuliano (deduct up to three for these sub-steps):
 - Find all clients who had an appointment with Giuliano.
 - Use that to find all those who didn't.
 - Put their CID together with 0.
- Union the two.

Total number of possible deductions is 8. Minimum mark is zero.

Empty page you can use as work area. This page will not be marked unless you clearly indicate that a solution is written here.

Question 4. [6 MARKS]

Indicate if the statements below are correct (true) or incorrect (false). Circle at most one answer for each. **Do not guess.** One point for each correct answer, -1 for each incorrect answer, 0 points if you leave the answer blank. The questions refer to the following tables:

```
create table R (A int, B int);
create table S (B int, C int);
create table T (B int, C int);
```

Part (a) [1 MARK]

The following is an illegal SQL query:

```
SELECT avg(A), B
FROM R, S
WHERE S.C = 97
```

True False

Part (b) [1 MARK]

The following queries are equivalent (meaning for all instances of S they return the same results):

```
SELECT COUNT(*) FROM S WHERE B > C
SELECT COUNT(B) FROM S WHERE B > C
```

True False

Part (c) [1 MARK]

If a tuple of R has a B value that matches some but not all B values in S , it is included in the result of the following query:

```
SELECT * FROM R WHERE B <> ALL (SELECT B FROM S)
```

True False

Part (d) [1 MARK]

The following queries are not equivalent (meaning for at least one instance of R and S they return different results):

```
SELECT S.C FROM R, S WHERE R.B = S.B
SELECT S.C FROM S WHERE B in (SELECT B FROM R)
```

True False

Part (e) [1 MARK]

The following is a legal SQL query:

```
(R) UNION (SELECT B A, C B FROM S)
```

True False

Part (f) [1 MARK]

Suppose $Q1$ and $Q2$ are subqueries. The number of tuples in $Q1$ union all $Q2$ is the number of tuples in the result of $Q1$ plus the number of tuples in $Q2$.

True False

Marking: “One point for each correct answer, -1 for each incorrect answer, 0 points if you leave the answer blank.” Minimum overall mark for the question is zero.

Question 5. [8 MARKS]

Consider the following CREATE TABLE declarations:

```
create table MovieExec (  
    Name char(30),  
    ID int primary key );  
create table MovieStudio (  
    Name char(30) primary key,  
    President int references MovieExec(ID)  
        on delete set null  
        on update cascade );
```

For each of the following questions, assume that

MovieExec = { ('John', 32), ('Arnold', 11), ('Sara', 98) } and

MovieStudio = { ('Disney', 98), ('MGM', 32) }

when the SQL statement is executed. Show the contents of the two tables afterwards. If the statement gives an error, explain.

Part (a) [2 MARKS]

```
insert into MovieStudio values ('WLM Productions', 50);
```

Part (b) [2 MARKS]

```
delete from MovieExec where name = 'Sara';
```

Part (c) [2 MARKS]

```
update MovieExec set ID = 0 where name = 'Sara';
```

Part (d) [2 MARKS]

```
insert into MovieExec values ('William', 11);
```

Marking: We'll have to look at some student answers to decide whether part marks make sense for this question.

Last Name: _____ **First Name:** _____

*Last Page. Your name **MUST** be on this page.*