CSC B20 H3 F 2016 Midterm Test Duration — 50 minutes Aids allowed: none	Student Number:	
Last Name:	First Name:	
Lab Section: Monday @		Instructor: Bretscher

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.) Good Luck!

	# 1:/ 6
This midterm consists of 4 questions on 6 pages (including this one). When you receive the signal to start, please make sure that your copy is complete.	# 2:/12
Comments are not required except where indicated, although they may help	# 3:/ 4
us mark your answers. They may also get you part marks if you can't figure out how to write the code.	# 4:/ 3
If you use any space for rough work, indicate clearly what you want marked.	
	TOTAL:/25

# Question 1. [6 MARKS]

Suppose we have two relations:  $Player(\underline{PID}, Salary)$  and  $Teams(\underline{PID}, \underline{City})$ . The three different attributes are player id (PID), player salary and the player's team's location (City).

				PID	City
	PID	Salary (in 1000s)		10	Toronto
	1	200		4	Ottawa
Player	3	250		4	Toronto
	2	1000	Teams	3	Montreal
	10	500		10	Vancouver
	4	500		4	Boston
	5	600		5	Edmonton
				1	Winnipeg

For each for the following relational algebra expressions, give the resulting relation including schema and data (i.e., draw the resulting table) **and** summarize in words the meaning of the resulting relation.

Part (a) [2 MARKS]

 $\Pi_{\rm PID}(\sigma_{\rm (Salary > 500)})$  Player )

### Part (b) [2 MARKS]

 $\Pi_{\text{A.PID, B.PID}}(\rho_A \text{ (Player)} \bowtie_{(\text{A.PID } != \text{B.PID} \land \text{A.Salary} = \text{B.Salary})} \rho_B(\text{Player}))$ 

Part (c) [2 MARKS]

This question is tricky - do not spend too much time on it.

 $\Pi_{\text{PID}} \text{ (Player - } (\Pi_{\text{A.PID}, \text{ A.Salary}}(\rho_A \text{ (Player)} \bowtie_{(\text{A.Salary} > \text{ B.Salary})} \rho_B(\text{Player})))$ 

## Question 2. [12 MARKS]

Consider the following relational schema. You may assume that CID and SID are unique IDs.

clients(CID, name, phone) employees(SID, name) appointments(CID, date, service, SID)

Part (a) [2 MARKS]

Underline the keys for each relation. List below any foreign key or referential constraints.

Part (b) [2 MARKS]

Find the client name and service each client has had.

#### Part (c) [2 MARKS]

Find the name and phone number of each client having an appointment in the future (date is greater than 20160229).

### Part (d) [2 MARKS]

Find the names of patients who are frequent clients (ie have more than 20 appointments on record).

#### Part (e) [2 MARKS]

Return a count of the number of days the clinic has had appointments.

#### Part (f) [2 MARKS]

Find all those staff member SIDs that are doctors. You may assume a doctor has 'Dr.' in their name.

## Question 3. [4 MARKS]

Suppose that now the clinic would like to open multiple locations. To incorporate this into their database they have decided to add a new relation that indicates which staff members work at each location:

#### location(address, SID)

#### Part (a) [2 MARKS]

Given this additional relation, is there any other information that the clinic might want included in the database such as additional relations or attributes? Explain your reasoning.

#### Part (b) [2 MARKS]

If the only clinic location to start is clinic = 'Morningside', write MySQL code to populate the location relation with all possible staff currently in the database.

# Question 4. [3 MARKS]

When should you use

JOIN ... ON <condition>

versus

JOIN ... WHERE <condition>

when applying a condition to a SELECT query? Explain how this can affect query time.

[Use the space below for rough work. This page will not be marked, unless you clearly indicate the part of your work that you want us to mark.]