# Midterm Exam - Part I (Section A1)

Q1. [9 marks] Draw an ER diagram to model the following scenario. Make sure the keys are identified and all other constraints are captured in your diagram.

Each match has an id (which is unique) and a date, and each team has a unique name. For each match, there is a home team and a visitor team. The number of goals scored by both home and visitor teams are kept. Each city has a name and a population, and each team has a home city.
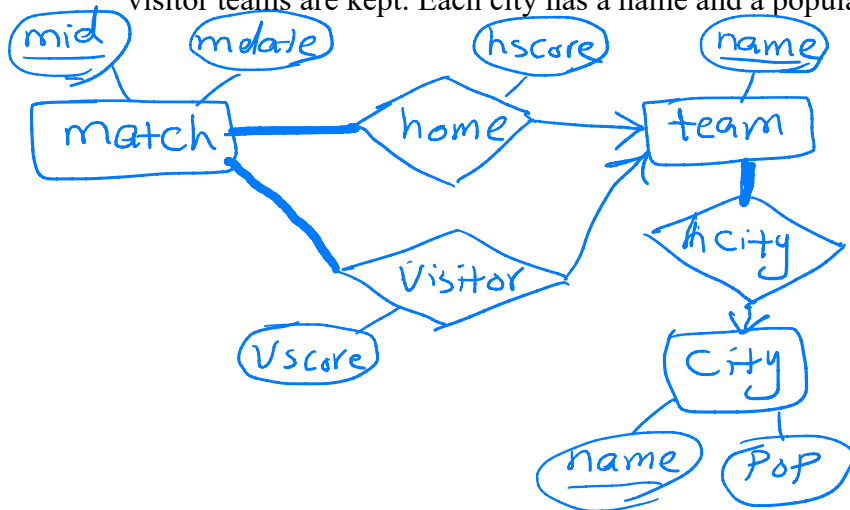
hscore & vscore can be attributes of match as well.

Q2. [6 marks] Consider the following tables (as seen in our lectures):

branch (<u>bname</u>, address, city, assets)
customer(<u>cname</u>, street, city)
deposit(<u>accno</u>, cname, bname, balance)
loan(<u>accno</u>, cname, bname, amount)

a) Write a relational algebra query to find the account number and branch name for loans given to customers living in Edmonton.

$$\Pi_{accno, bname} \; \sigma_{city = \text{Edmonton}} \; (customer \bowtie loan)$$

b) Write a relational algebra query to find customers with a deposit account but no loan over 100,000.

$$\Pi_{cname} \; deposit - \Pi_{cname} \; \sigma_{amount > 100,000} \; loan$$

Q3. [6 marks] Mark each statement or equality as either *True* or *False* (no need for an explanation). Tables branch and customer are as described in Question 2.

(a) False (b) True (c) False

Q4. [3 marks] Consider relations R(a,b) and S(b) and the division R/S. We want to write division using other relational algebra operators. Complete the following expression, filling the question mark with a relational algebra expression, to make the equality hold.

$R/S = \pi_a R - \pi_a(\; ? \;)$ $\pi_a(R) \times S - R$

Q5. [3 marks] Consider the deposit table (as described in Question 2) with 3 deposit accounts a1, a2, and a3 and balances 500, null and 5000 respectively. What does the following query return?

```
select accno
from deposit
where not (balance <= 700);
```

a3

Q3

a) branch ⋈ deposit = branch × deposit

b) SQL tables can have more than one candidate key.

c) In ER, a weak entity can have two owners.