

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 - write your name and id on all of them (additional pages may be used but should not be necessary). Marked exams will be (tentatively) available on Mar 13 (in class). Deadline for appeals is Mar 20 at 5 pm.

Question 1 (20 + 5 marks) Consider the following (simplified) scenario:

An art gallery keeps information about artists, their names (which are unique), age and style of art. For each piece of artwork, the artist, the year it was made, its unique title, its type (e.g., painting, sculpture, etc) and its price must be recorded. Pieces of artwork are also classified into groups (e.g., portraits, still life, etc), all pieces must belong to at least one group. Each group is identified by a name describing the group. The gallery has customers, for whom the galleries keep their unique name, address, amount of dollars they have spent in the gallery and the artist and group the customer likes best.

- a) Design an ER diagram for the above scenario
- b) Map the ER diagram from (a) into the relational model

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Question 3 (9 x 5 marks) Consider the following relations:

- Book(bid, aid, btitle, sales) - aid refers to Author.aid
- Publisher(pid, pname, revenue, pcity)
- Author(aid, aname, acity)
- BAP(bid, pid, year) - bid refers to Book.bid, aid refers to Author.aid and pid refers to Publisher.pid

Re-write the following statements (e.g., queries) in SQL:

- Find the names of publishers in Edmonton with revenues greater than \$100,000.
- Find all pairs of publishers (pid attributes) such that both publishers are located in the same city.
- Find the book numbers (bids) of all books published by more than one publisher.
- For each publisher, find the quantity of books it published in 1996.

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- e) Find the authors (i.e., their aids) who are located in the same city as A1 or in the same city as A2 (A1 and A2 are aids).

- f) For each city where there is at least one publisher, find the total (combined) revenue of all publishers in that city.

- g) Find the bids of books with a sales value less than the average sales value for all other books combined.

- h) Find the names of the publishers who publish all books.

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- i) Find the pids of the publishers who publish at least those books published by publisher P2 but none of the books published by P3 (P2 and P3 are pids).

Question 4 (2 x 4 marks) Consider the following relations:

<i>R</i> :	<i>C1R</i>	<i>C2R</i>	<i>S</i> :	<i>C1S</i>	<i>C2S</i>	<i>C3S</i>
	a	b		a	b	c
	a	c		a	b	a
	b	d				

Show the result (in tabular form as above) of the following relational algebra operations:

a) $\pi_{C1S, C3S} (\sigma_{C2S=b} S)$

b) $\sigma_{C2R=C3S} (S \times R)$

Question 5 (10 marks) Consider the following statement:

“The way the primary key is defined for a binary relationship determines its cardinality and vice-versa”

Is this statement true or false ? Justify your answer (you may use examples).