**CS 4721 (Database Design I) [Spring 2019]**

**Assignment:**

**Due date: 11:30 A.M., Friday, March 15, 2019**

**Question 1.** Consider the following relational DB schema (primary keys are underlined).

**HOTEL (hotelNo, hotelName, city)**

**ROOM (roomNo, hotelNo, type, price)**

**RESERVATION (hotelNo, guestNo, dateFrom, dateTo, roomNo)**

**GUEST (guestNo, guestName, guestAddress)**

Describe the queries that are expressed by the relational algebra expressions. [**2+2+2 = 6 points**]

i) σ HOTEL.hotelNo=ROOM.hotelNo (HOTEL × ROOM)

Shows all hotels and the rooms for those hotels.

ii) π hotelName (HOTEL HOTEL.hotelNo=ROOM.hotelNo (σ price > 50 ROOM))

Show unique hotel names and their rooms with prices over 50.

iii) π hotelNo (σ price > 50 ROOM)

Show unique hotel numbers with rooms at a price greater than 50.

**Question 2.** Consider the same schema from question 1 and express the following queries using relational algebra expressions: [**3 + 3 + 3 = 9 points**]

i) List the price and type of all rooms at the “Governor Hotel”.

π price, type(σ hotelName = “Governor Hotel”(ROOM HOTEL))

ii) List all guests who stayed at the “Governor Hotel” between 31st December 2018 (check-in) and 1st January 2019 (check-out).

π guestName(σ hotelName = “Governor Hotel” and dateFrom = 31st December 2018 and dateTo = 1st January 2019(HOTEL RESERVATION GUEST)

iii) List all room numbers and types in “Governor Hotel”.

π roomNo, type(σ hotelName = “Governor Hotel”(ROOM HOTEL))

**Question 3**. The following relations keep track of airline flight information.

**Flight (*flno:* int, *from:* varchar(20), *to:* varchar(20), *distance:* real, *departs:* time, *arrives:* time, *price:* real)**

**Aircraft (*aid:* int, *aname:* varchar(20), *cruisingrange:* real)**

**Certified (*eid:* int, *aid:* int)**

**Employee (*eid:* int, *ename:* varchar(20), *salary:* real)**

Note that the Employee relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft, and only pilots are certified to fly. Write each of the following queries in relational algebra expressions. [**3 + 3 = 6 points**]

i) Find the names of pilots certified for the aircraft ‘Boeing-777’.

π ename(σ aname = “Boeing-777”(AIRCRAFT CERTIFIED EMPLOYEE))

ii) Find the names of pilots who can operate planes with a cruising range greater than 3,000 miles.

π ename(σ cruisingrange > 3,000(AIRCRAFT CERTIFIED EMPLOYEE))

**Question 4**. Consider the two tables T1 and T2 as shown below. Show the results of the following operations (assuming T1 and T2 are set-compatible). (**3 + 3 + 3 = 9 points**)

|  |  |  |
| --- | --- | --- |
| P | Q | R |
| 10 | **a** | **5** |
| 15 | **b** | **8** |
| 25 | **a** | **6** |

|  |  |  |
| --- | --- | --- |
| A | B | C |
| 10 | **b** | **6** |
| 25 | **c** | **3** |
| 10 | **b** | **5** |

**T1 T2**

**a)** T1  T2

T1.Q=T2.B

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P** | **Q** | **R** | **A** | **B** | **C** |
| **15** | **B** | **8** | **10** | **B** | **6** |
| **15** | **B** | **8** | **10** | **B** | **5** |

**b)** T1  T2

T1.P=T2.A AND T1.R=T2.C

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P** | **Q** | **R** | **A** | **B** | **C** |
| **10** | **A** | **5** | **10** | **B** | **5** |

**c)** T1 *−* T2

|  |  |  |
| --- | --- | --- |
| **P** | **Q** | **R** |
| **10** | **A** | **5** |
| **15** | **B** | **8** |
| **25** | **A** | **6** |

**T1**  **T2**

**Submission guideline:** You have the following options to submit your assignment. Choose only one submission option that suits you best.

1. Submit a handwritten copy in class. Writing should be clear (readable). Include Course number (CS4721), Semester (Spring 2019), and your name at the top. Failure to include these will not be accepted, **OR**
2. Scan your handwritten copy (including information mentioned in (i)) and submit it through BlazeVIEW dropbox. Scan resolution should be good (readable), **OR**
3. Type your answers on a document file using MS-Word. Include all information (mentioned in (i)) and submit through BlazeVIEW dropbox. Make sure symbols are appearing appropriately.