DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
CSE 3330/5330 - Database Systems and File Structures

Exam #1
October 9, 2020
Due Date: Monday October 12, 2020 @ 11.59 pm

	Total Points	Earned
Multiple Choice	7	
Short Answer	20	
Query Questions	45	
Total	72	

Multiple Questions:

1. (1 point) Holds data about one and only one theme in most circumstances, if a table contains more than one theme is needs to be broken up into multiple tables
    - table
    - Type
    - Database
    - SQL
2. (1 point) Basic building blocks of a relational database
    - Entity
    - Index Key
    - Indexes
    - Entity Set
3. (1 point) A key of a relation that consists of two or more columns is a Composite Key
    - True
    - False
4. (1 point) structured query language: data definition and manipulation is SQL
    - True
    - False
5. (3 points) Given a view defined by the following SELECT statement:

```
SELECT avg(pageCount) as pageAvg, b.pubName
FROM Books b, Publisher p
WHERE b.pubName = p.pubName;
```

   Circle all true statements:
    - This view can be inserted into under the SQL standard
    - This view cannot be inserted into under the SQL standard because it has an aggregate column.
    - This view cannot be updated under the SQL standard because it is over multiple tables.
    - No views can be deleted from under the SQL standard.

Short Answer Question (5 points each):

1. List and define 2 different JOINS used in SQL?
2. What are the different types of statements supported by SQL? Define each one.
3. When and why does the `GROUP BY` clause get utilized in SQL statement?
4. What are aggregate functions in SQL? List 3 aggregate functions.

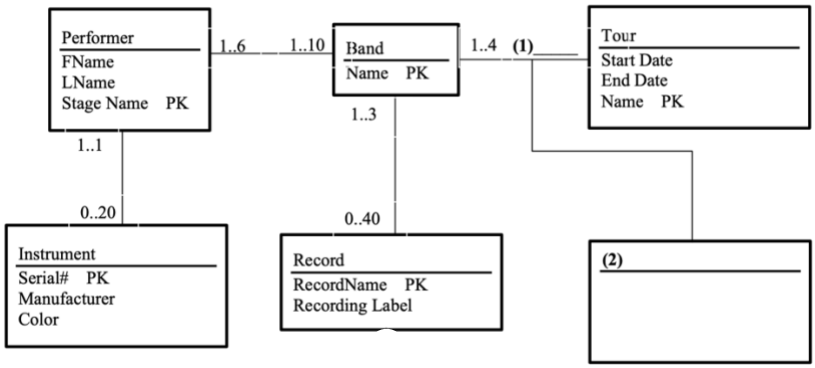
Query Questions:

1. (2 points) Consider the table `Driver (licenseNum, firstName, lastName, age)`, part of a simple driver registration database. Every row of Driver has a unique licenceNum. Write a query in SQL to give the first and last names of all drivers that share a last name with another driver.

2. Given another relation `Voter (voterID, firstName, lastName, district)`, write a query in SQL to find all (first name, last name) pairs that are associated with a voter in district = '42', and also associated with a driver under the age of 25. Every row of Voter has a unique voterID.
    a. (2 points) Write the query using the INTERSECT operator
    b. (2 points) Write the query WITHOUT using the INTERSECT operator

3. (2 points) Given the two relations:
   `Book(ISBN PK, title, pagecount, pubName FK ref(publisher) )`
   `Publishers(pubName PK, city, state)`
   Write the SQL creation statement for a virtual view named Bookcities. It should have the title and publishing city of every book.

4. Use the following UML diagram:



    a. (1 point) If each band goes on at most 30 tours and can have gone on 0 tours, write in the count for the relation at **(1)**.
    b. (2 points) Write the association class WentOn at **(2)**. When a band goes on tour it gets three attributes a Take, a PlayOrder, and HasMerch.
    c. (5 points) Convert this UML diagram to an ER diagram.
    d. (5 points) Design the schema for the above UML diagram.

5. For the following questions utilize the following schema and entity set:
   `Vehicle(VRN, Ma, Mo, Color) , Own(VRN, SSN) , Person (SSN, Name, Addr, Phone)`

Vehicle

VRN	Ma	Mo	Color
123	Honda	Hawk	Red
234	Mazda	RX7	Blue
345	Ford	Taurus	Blue
456	Ford	Ranger	Green
567	Honda	Accord	Red
678	Mazda	RX7	Silver
789	VW	Bug	White
890	Suzuki	Intruder	Black
901	Harley	Sportster	Black
012	VW	Bug	Red

Own

VRN	SSN
123	bcd
234	abc
456	def
567	ghi
683	def
795	abc
901	bcd

Person

SSN	Name	Addr	Phone
abc	Dave	Birch	xxx
bcd	Mary	Grove	yyy
cde	Sriram	Oak	zzz
def	Fang	Birch	www
efg	Derek	Elm	uuu
fgh	Joan	Elm	vvv
ghi	Xie	Oak	sss
hij	Gilford	Birch	ttt

   a. (4 points) Write a query that returns the Name and Phone of all Persons owning VRN=456.
   b. (4 points) Write a query that returns the Name and Phone of all Persons owning a Suzuki.
   c. (4 points) Write a query that returns the Models and Colors of all vehicles owned by someone on Elm.
   d. (4 points) Write a query to show the VRN and Mo of each owned Vehicle BY SOMEONE ON 'Birch' and the Name of the Person who owns it.
   e. (4 points) Write a query that returns pairs of Names for (different) Persons that live at the same Addr.
   f. (4 points) Write a query that lists pairs of Persons by SSN and Name that own a Vehicle of the same Ma, Mo and Color