**CSCI 4333 Database Design and Implementation**

**Assignment #1**

Instructor: Dr. Xiang Lian

Due Date: See the course Web page

**Description**

State your answers legibly and concisely.

**Problem 1. Answer the following questions (40 points).**

1) What is Relational Model?

2) What are relation, relation instance, and relation schema?

3) What are relational database, database instance, and database schema?

4) What is integrity constraint? Give an example.

5) What are candidate key, primary key, and superkey of a relation?

6) What is a foreign key?

7) What does NULL represent in a relation?

8) Why should NULL values be avoided?

9) Why is it important to distinguish candidate keys and superkeys? What if a superkey designated as a primary key?

10) What integrity constraint enforcement mechanisms are available in an RDBMS?

**Problem 2. Answer the following questions (40 points).**

1) What is transaction?

2) What are ACID properties?

3) State five possible integrity constraints for an online auction system (e.g., eBay).

4) Explain how one or more of these integrity constraints can be violated by a transaction, if Atomicity is not enforced.

5) Explain how one or more of these integrity constraints can be violated by a transaction, if Consistency is not enforced.

6) Explain how one or more of these integrity constraints can be violated by a transaction, if Isolation is not enforced.

7) Explain how one or more of these integrity constraints can be violated by a transaction, if Durability is not enforced.

8) Does MySQL support transactions? Give an example in MySQL SQL dialect.

9) Does Oracle support transactions? Give an example in Oracle SQL dialect.

10) Can a transaction that did not complete yet violate integrity constraints? In other words, can an intermediate database state be inconsistent?

**Problem 3. Write SQL statements that create tables in Figure 1 (see below). Make sure to specify primary and foreign key constraints (20 points).**

**Problem 4 (Bonus Question). Write SQL statements for the database in Figure 1 to (20 extra points):**

1) Insert row (310, ‘RAT’, ‘Relational Algebra Toolkit’, 2013) into table P.

2) Select Names of all projects.

3) Select Names of students majoring in IT.

4) Select Names of students working on project with PID = 300.

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**Figure 1:** Student Research Database

**Submission**

Submit an electronic copy of your homework solution to the [**Blackboard**](https://mycourses.utpa.edu/).

**Grading**

Problems 1, 2, 3, and 4 receive 40, 40, 20, and 20 points, respectively (120 total, if solved correctly).