INFS1200/7900 MOCK QUIZ 2

Name: _____ Student #: _____

Signature: _____

Notes about this examination

1. You have **90 minutes** (1 hour and 30 minutes) to write this examination.
2. Write your name, student #, and signature in ink (pen). You may use a pencil to write your solutions.
3. Answer all the questions on this paper.
4. The marks for each question are given in [].
5. Good luck!

Question	Mark	Max
Q1		10
Q2		15
Q3		20
Q4		15
Q5		15
Total		**75**

Functional Dependencies and Normal Forms

Q1. **[10 marks]** Answer the following questions.

Q1A. Suppose you are given a relation R(A,B,C,D) with the following functional dependencies:

AB→C, AB→D, C→A, D→B

Is R in BCNF? If not, decompose this relation into BCNF using the algorithm we covered in class and in the book; circle all answers in your final decomposition. Show all your work (5 marks).

Q1B. Suppose you are given a relation R(A,B,C,D) with the following functional dependencies:

AB→C, AB→D, C→A, D→B

Is R in 3NF? If not, decompose this relation into 3NF using the algorithm we covered in class and in the book; circle all answers in your final decomposition. Show all your work (5 marks).

The rest of the questions on this quiz are related to the database schema and database instance, which is on Appendix A. Please review it carefully and answer all of the following questions. For each query remove duplicates from your final answers where they are not explicitly requested, and include no extra columns).

2. **[15 marks]** Write the following SQL queries **without using subqueries.**

2A. Find the name of the ships that have more than 8 guns (4 marks).

Query

2B. Find those countries that have ship models with both less than 7 and greater than 7 guns. (Assuming the intersect operator is **not** implemented). Show the result of your query using data from Appendix A (5 marks).

Query	Result

2C. Find the number of ships that participated in each battle. Show the result of your query using data from Appendix A (6 marks).

Query	Result

3. **[20 marks]** Write the following SQL queries using **at least one subquery**. Show the result of your query using data from Appendix A for parts 2A and 2B.

3A. Find the models of ships, at least one of which was 'sunk' in a battle (6 marks).

Query	Result

3B. Find the name of the heaviest ship model(s) (7 marks).

Query	Result

3C. Find countries with at least two ship models, where at least one of the models has more guns than the average number of guns across all of the ship models (7 marks).

Query

4. **[15 marks]** Write the following SQL queries. You can use any of the operators taught in the lectures.

4A. Find the name of ships for which there exists some other ship with the same model that was launched after 1943. For example Missouri would be on the list since Wisconsin is of the same model (Iowa) and was launched after 1943 (7 marks).

Query

4B. Find the models of ships that exactly two of which fought in the same battle or have at least 3 different ships. Show the result of your query using data from Appendix A (8 marks).

Query	Result

5. **[15 marks]** The following questions are related to modifying data and integrity constraints.

5A. Delete from table Ships all ships sunk in battles (3 marks).

Query

5B. Modify the shipModels relation so that gun bores are measured in centimeters instead of inches. Note that the attribute type of bore is double. (one inch = 2.5 centimeters) (3 marks)

Query

5C. Write a query for creating the Ships table that would enforce the launched year to be between 1000 and 2020. You may assume any reasonable format/domain for the fields (4 marks).

Query

5D. Add a constraint that no more than 3 ships of the same model can participate in a single battle (5 marks).

Query