

Faculty of Science

Course: CSCI 3030U Database Systems and Concepts

Final Exam – December 1st 2022

Time limit: 1 hour 20 minutes

Midterm 2 (15%)

INSTRUCTIONS

**Once completed submit your answers on Canvas.**

* 1. **Once you submit the files on Canvas, download it (PDF or .doc) and ensure it is not corrupted.**
  2. **Duration 80min: 3.40pm-5.00pm, unless university accommodation is provided (if you have accommodation, and Canvas marks it as late, ignore it, as you will not be given penalty, if you submit within allocated extra time frame).**
  3. **While writing your solutions to hand in, you may look at the course textbook and lecture notes, but no help from other students is allowed.**
  4. **Provide answers in blue font colour.**

Good luck!

1. **(3 Points)**



* 1. What is the difference between CASCADE and RESTRICT grant options? (**1 Point**)
  2. Assume user A executes REVOKE P FROM B RESTRICT. Describe how is it going to affect the grant diagram presented above? (**1 Point**)
  3. Which revoke operations have to be executed from user A, so user C loses all privileges? (**1 Point**)

1. **(5 Points)**

**Normalization**:

* 1. What does normalization mean? (**1 Point**)
  2. What does anomaly mean? (Provide an example) (**1 Point**)
  3. What does it mean that relation is in BCNF (provide clear definition)? (**1 Point**)
  4. Assume set of FDs F = {BC 🡪 A, BC 🡪 D, BC -> E, F -> G, F -> H} over the table T. Is the table T in BCNF? Provide justification. If answer is no, decompose table T into the BCNF form. (**2 Points**)

1. **(3 points)**

**Closure test.** Assume a set of FDs F = {AB 🡪 CD, E 🡪 F, GH 🡪 IJ, F 🡪 GH, I 🡪 K, LM 🡪 N, N 🡪 O}.

* 1. Compute a closure of ABE+. Describe all intermediate steps. (**2 Points**)
  2. Based on the closure information is true that ABE 🡪 I, ABE 🡪 K, ABE 🡪 L? (**1 Point**)

1. **(4 Points)**

**Bank Account Case Study.**

Consider a database for a bank, including information about customers and their accounts. Information about a customer includes their name, address, phone, and Social Security number. Accounts have numbers, types (e.g., savings, checking) and balances.

* 1. How a typical data about banks and customers could be represented as a DTD. (**2 Points**)
  2. Provide a sample XML document for the provided DTD. In your XML document include information about 2 customers and for each customer provide sample 1 account (**2 Points**)