

EGCI321 Database System

- Assignment 2 (10%) -
Due Tuesday 25th November 2025 by 14:00

Instruction:

- This is an individual assignment.
- Name your file according to this format: a2_studentid.pdf. For example, a2_6481234.pdf

1. (2 marks) Using Armstrong's axioms plus union and decomposition, prove the following:

Given attribute sets A, B, C, and D, if $A \rightarrow D$ and $C \rightarrow B$, $B \rightarrow A$ and $D \rightarrow C$ then
 $B, D \rightarrow A, C$.

2. (2 marks) Let R be a relational schema with attributes { M, N, O, P, Q, S } and let F be the set of functional dependencies $F = \{ MN \rightarrow OP, O \rightarrow Q, QS \rightarrow N, S \rightarrow P \}$. Prove whether R is in 3NF or BCNF.

3. (2 marks) Let R be a relational schema with attributes { A, B, C, D, E, G, H } and let F be the set of functional dependencies

$$F = \{ AB \rightarrow C, AC \rightarrow B, BC \rightarrow EG, AD \rightarrow E, B \rightarrow DG, BE \rightarrow A, AE \rightarrow CG, A \rightarrow H, BD \rightarrow H \}$$

Find the minimal cover.

4. (5 marks) Consider the following schedule, where $r_i(v)$ means that transaction i reads object v and $w_i(v)$ means that transaction i writes to object v.

$r_2(x) r_3(y) r_1(x) w_3(y) w_1(x) r_4(y) r_1(z) w_4(y) r_2(y) r_3(z) w_2(y)$

- (a) (2 mark) List all pairs of conflicting operations in this schedule.
- (b) (2 mark) Draw the conflict graph for this schedule.
- (c) (1 mark) If the schedule is serializable, give an equivalent serial schedule. If it is not serializable, then explain why not.