Assignment 4: Database Design

Started: Apr 19 at 10:23am

Quiz Instructions

Question 1 — 10 pts

Consider a relation schema R (A, B, C, D, E) that satisfies the set of functional dependencies: F = {BC → D, D → E, A → C, B → C}.

Is BC→ E in F+? Please justify. Justification carries 7 points.

Hint: For this question, you need to look at the different axioms presented in the slides. While a question like this will not be on the exam, this process is required in finding the closure, which is required in finding the candidate keys (which will be on the exam). So I hope this question will give more practice in preparing for the candidate key question.

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Question 2

10 pts

Consider a relation schema R (A, B, C, D, E) that satisfies the set of functional dependencies: F = {BC → D, D → E, A → C, B → C}.

Calculate (AB)+.

Hint: Similar to the previous question, finding a closure is a necessary step in the finding the candidate keys (which will be on the exam).

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Question 3

15 pts

Consider a relation schema R (A, B, C, D, E) that satisfies the set of functional dependencies: F = {BC → D, D → E, A → C, B → C}.

Find all the candidate keys of R and show your steps to find them. Steps will carry 10 points.

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Question 4

10 pts

Consider a relation schema R (A, B, C, D) that satisfies the set of functional dependencies F = {AB → D, D → C}.

Is R in BCNF? Please justify your answer. (Justification carries 8 points.)

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Question 5

10 pts

Consider a relation schema R (A, B, C, D) that satisfies the set of functional dependencies F = {AB → D, D → C}.

Is R in 3NF? Please justify your answer. (Justification carries 8 points.)

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Question 6

15 pts

Consider a relation schema R (A, B, C, D) that satisfies the set of functional dependencies F = {A → B, BC → D}.

Find all the candidate keys of R. Steps will carry 10 points.

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Question 7

20 pts

Consider a relation schema R (A, B, C, D) that satisfies the set of functional dependencies F = {A → B, BC → D}.

Is R in BCNF? If R is not in BCNF, give a lossless-join BCNF decomposition of R.

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Question 8

10 pts

Consider a relation schema R (A, B, C, D) that satisfies the set of functional dependencies F = {A → B, BC → D}.

Is R in 3NF? Please justify your answer. (Justification carries 8 points.)

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