Quiz 6 Functional Dependencies & Normalization

Due Oct 11 at 10:25am   **Points** 100   **Questions** 6

Available Oct 11 at 10am - Oct 11 at 10:25am 25 minutes   **Time Limit** None

Instructions

This Quiz is 25 minutes long and contains 4 multiple choice, 1 short answer, and 1 short free-response question. Type your answer in the box for the essay questions.

Having an issue with the quiz? Please send an email to the course staff (**rkheni@wpi.edu) (mailto:cvieira@wpi.edu)** with "CS542 Quiz" included in the subject line any time during the quiz. If you require help through zoom then please join the zoom link **https://wpi.zoom.us/j/2094237642** ⤷ **(https://wpi.zoom.us/j/2094237642)** .

This quiz was locked Oct 11 at 10:25am.

Attempt History

	Attempt	Time	Score
LATEST	**Attempt 1**	24 minutes	37.5 out of 100

Score for this quiz: **37.5** out of 100

Submitted Oct 11 at 10:24am

This attempt took 24 minutes.

Question 1   11.25 / 15 pts

Given the following relation R = (Q, T, L, P, H, N), and the following dependencies

F = {QT → PN,   PH → QL,   TP → QH,   PL → N,   T → N,   T → H }

Select if the following functional dependencies hold for R given F.

PH → QLN Yes

QT → H No

QTL → N Yes

TL → NPH No

Answer 1:

Yes

Answer 2:

Yes

No

Answer 3:

Yes

Answer 4:

No

Question 2   0 / 15 pts

Given the following relation R = (Q, T, L, P, H, N), and the following dependencies

F = {QT → PN,   PH → QL,   TP → QH,   PL → N,   T → N,   T → H }

List all candidate key(s) for this Relation. **This question is auto-graded, so please separate them by commas with a space in all caps.**

For example, if you believed that QTL and PHN were candidate keys, enter *QTL, PHN,* or if you believed that TN, TP, and QL were candidate

keys, enter *TN, TP, QL*. If there is only one candidate key, enter it directly. The order of the keys that you enter does not matter.

QT, QL, TP, PL

TP, QT

TP, TQ

PT, QT

PT, TQ

QT, TP

TQ, TP

QT, PT

TQ, PT

TP,QT

TP,TQ

PT,QT

PT,TQ

QT,TP

TQ,TP

QT,PT

Question 3

0 / 10 pts

Given the following relation R = (Q, T, L, P, H, N), and the following dependencies

F = {QT → PN,   PH → QL,   TP → QH,   PL → N,   T → N,   T → H }

If R is decomposed into R1= (Q, T, N) and R2 = (T, L, P, H), is this decomposition *lossy or lossless? Is it dependency preserving?*

○ Lossy, not dependency preserving

◉ Lossless, not dependency preserving

Lossless, dependency preserving

Question 4

0 / 10 pts

Given the following relation R = (Q, T, L, P, H, N), and the following dependencies

F = {QT → PN,   PH → QL,   TP → QH,   PL → N,   T → N,   T → H }

If R is decomposed into R1= (Q, T, L, P) and R2 = (Q, T, H, N), is this decomposition *lossy or lossless? Is it dependency preserving?*

Lossy, not dependency preserving

rrect Answer

Lossless, not dependency preserving

Lossy, dependency preserving

ou Answered

Lossless, dependency preserving

Question 5

11.25 / 15 pts

Given the following relation R = (Q, T, L, P, H, N), and the following dependencies

F = {QT → PN,   PH → QL,   TP → QH,   PL → N,   T → N,   T → H }

Given the relation R, which of the functional dependencies in F violate BCNF (if any)? Select all that violate BCNF

rrect Answer

□ PH → QL

□ TP → QH

Correct!

☑ PL → N

Correct!

☑ T → N

Correct!

☑ T → H

Question 6   15 / 35 pts

Given the following relation R = (Q, T, L, P, H, N), and the following dependencies

F = {QT → PN,   PH → QL,   TP → QH,   PL → N,   T → N,   T → H }

Decompose R into BCNF, and show your steps. If R is already in BCNF, state why. Is your decomposition lossy or lossless?

Please type your answer into the text box below.

Your Answer:

For R1:
- QT → PN (already included)
- T → N (included)
- No more dependencies violating BCNF

For R2:
- PH → QL (violating BCNF)
- TP → QH (violating BCNF)
- PL → N (no longer relevant)

Further decomposing R2 :
Create a new relation R3 with the attributes involved in dependencies 2 and 3: R3(T, P, H, L)

Now, let's consider the dependencies for each new relation:

For R1:
- QT → PN
- T → N

For R3:
- PH → QL
- TP → QH

The decomposition is lossless because we have not lost any information during the process. The original relation R can be reconstructed by joining R1 and R3 using the common attribute T.

So, the decomposition into BCNF is as follows:
- R1(Q, T, P, N)
- R3(T, P, H, L)

It is in BCNF, and it is lossless.