Assignment 2

Please make sure that you always use notations consistent with lecture notes. Different notations will not be accepted. The deadline of assignment 2 is:

Fri 04 May, 5:00 pm

Question 1 (10 marks)

Consider a relation $R(A, B, C, D, E, G, H, I, J, K)$ and its FD set $F = \{A \rightarrow BC, E \rightarrow AD, BD \rightarrow E, CE \rightarrow DH, H \rightarrow G, EI \rightarrow J\}$.

1) Check if $C \rightarrow J \in F^+$. (1 marks)

2) Find a minimal cover F_m for F. (2 marks)

3) Regarding F, is the decomposition $R_1 = \{ABCDE\}$, $R_2 = \{EGH\}$, $R_3 = \{EIJK\}$ of R lossless-join? Please justify your answer. (2 marks)

4) List at least 5 super-keys for R. (2 marks)

5) Is it possible to decompose R into a collection of BCNF relations and ensure the decomposition is dependency-preserving and lossless-join? Please justify your answers. (3 marks)

Question 2 (6 marks)

Following is the schedule A for transactions T_1, T_2, and T_3:

Schedule A

Time \ Transaction	T_1	T_2	T_3
1	~~write(X)~~ read(X)		
2			read(Z)
3		~~write(X)~~ read(X)	
4	~~write(Z)~~ read(Z)		
5		read(Z)	
6			~~write(Y)~~ read(Y)

7			
8			
9			~~write(X)~~ read(X)
10	read(Y)		

1) Assume that the system crashes at time 8, what should be done to recover the system? (3 marks)

2) Assume a checkpoint is made at time 7, what should be done to the three transactions when the crash happens at time 8? (3 marks)

Note: We assume a transaction will be committed immediately after all the read/write operations of it are done.

Question 3 (4 marks)

Give and justify the answers regarding the following problems:

1) Construct a scenario that First in First Out (FIFO) buffer replacement policy is better than Most Recently Used (MRU) buffer replacement policy. (2 marks)

2) Construct a scenario that First in First Out (FIFO) buffer replacement policy is better than Least Recently Used (LRU) buffer replacement policy. (2 marks)

Assignment Submission

We accept electronic submissions only. Please submit your assignments as follows:

- The file name should be ass2.pdf.
- Ensure that you are in the directory containing the file to be submitted. (note: we only accept files with .pdf extension)
- Type "give cs9311 ass2 ass2.pdf" to submit.
- Please keep a screen capture (including **timestamp** and the **size** of submitted file) for your submissions as proof in case that the system is not working properly. If you are not sure how, please have a look here.

Note:

1. If the size of your pdf file is larger than 2MB, the system will not accept the submission. If you face this problem, try converting to compressed pdf.
2. If you have any problems in submissions, please email to kai.wang@unsw.edu.au.

3. We do not accept e-mail submissions, and the submission system will be immediately closed after the deadline.

Late Submission Penalty

Zero mark