CSCI 4380 Spring 2018 Quiz 7 Answers [Time: 20 minutes]

Question (25 points).

(a) Given the following schedule:

$$r_2(L)\ r_1(X)\ r_1(Y)\ r_3(Z)\ w_2(X)\ w_1(Y)\ w_3(X)\ r_4(L)\ w_4(Z)\ r_1(Z)\ w_1(K)$$

1. List <u>all conflicts</u> and draw the conflict graph.

Answer.

$r_1(X)\ w_2(X)$,
$r_1(X)\ w_3(X)$,
$w_2(X)\ w_3(X)$,
$r_3(Z)\ w_4(Z)$,
$w_4(Z)\ r_1(Z)$

$T1->T2, T1->T3, T2->T3, T3->T4, T4->T1$

2. Discuss whether the schedule is serializable or not and why. If it is serializable, find a serial schedule that is equivalent to it.

Answer. No it is not serializable because there is a cycle in the conflict graph.

(b) You are given the following contents of the log and data pages after a crash. Answer each of the following questions YES/NO/NEI (not enough information), and provide a single sentence explanation of why you gave this answer.

```
LOG:
LSN    LOG ENTRY              PREVLSN
101    T1 update P1 10 20     -
102    T2 update P2 A B       -
103    T2 update P1 20 30     102
104    commit T2
105    T1 update P3 XY ZZ     101

DATA PAGES:
PAGE ID  LSN OF LAST UPDATE
P1         101
P2         102
P3         105
```

1. This schedule is possible under two phase locking.

Answer. Yes.

We have w1(P1) w2(P2) w2(P1) commit2 w1(P3)

This is possible using the following way to obtain locks:

xl1(P1) xl1(P3) w1(P1) xl2(P2) w2(P2) releaselock1(P1) xl2(P1) w2(P1) commit2 w1(P3)

2. This schedule is possible under strict two phase locking.

Answer. No, under strict 2PL, a transaction will not release a lock until it commits. So, T1 will hold its lock on P1 until commits, and hence LSN 103 cannot happen.

3. Steal is used.

Answer. Yes, steal must be used. Because P3 is changed by T1 and it is not yet committed. But the changes are written to disk. The same is true for P1.

4. Force is used.

Answer. No, force is not used. The change in LSN to P1 by the committed transaction T2 is not yet written to disk

103 T2 update P1 20 30 102