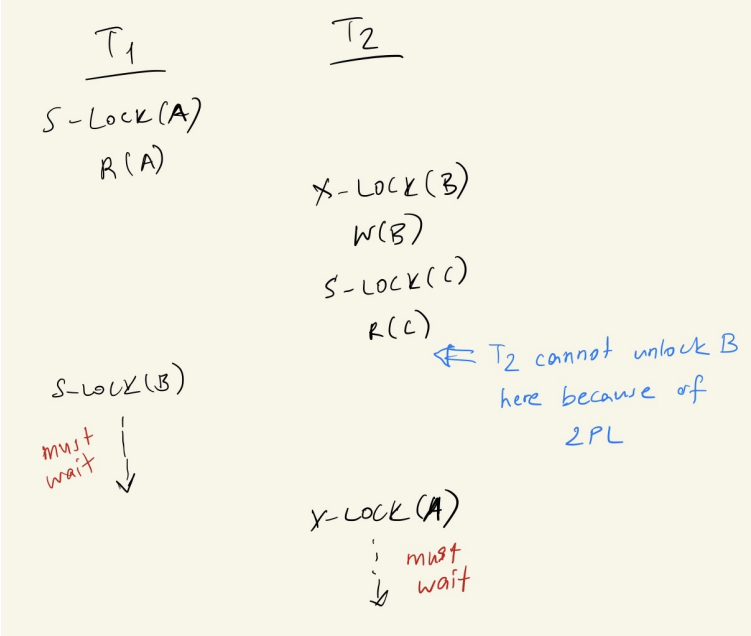
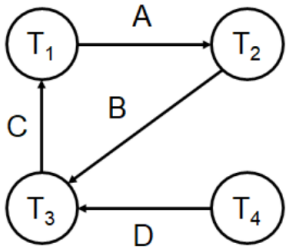
COMP 306: Database Management Systems
Fall 2023 - Exercise Solutions

Question 1. Yes, there exists a 2PL schedule in which these transactions would be deadlocked. Here is the schedule:



Question 2.

(a) The waits-for graph is:



(b) Yes, it contains a deadlock because there is a cycle: T1 → T2 → T3 → T1.

(c) t1: T1 is granted S-LOCK on C.
t2: T2 is granted X-LOCK on A.
t3: T3 is granted S-LOCK on D.
t4: T1 is denied S-LOCK on A. T1 waits for T2.
t5: T4 is denied X-LOCK on D. T4 started later than T3, so T4 aborts (T4 dies for T3).
t6: T3 is granted X-LOCK on B.
t7: T3 is denied X-LOCK on C. T3 started later than T1, so T3 aborts (T3 dies for T1).
t8: T2 is granted X-LOCK on B since T3 was aborted at time t7. When it was aborted, its X-LOCK on B was also released (per the specification in the question).