CS340 Quiz 3

Name: _____

Roll Number: _____

Total Marks: 25

Instructions

- In the multiple choice section, circle **one** option
- A correct answer is worth 2 marks and an incorrect answer will lead to a 1 mark deduction

1. Consider the following transactions with data items P and Q initialized to zero

```
T1: read (P) ;
    read (Q) ;
    if P = 0 then Q : = Q + 1 ;
    write (Q) ;
T2: read (Q) ;
    read (P) ;
    if Q = 0 then P : = P + 1 ;
    write (P) ;
```

Any non-serial interleaving of T1 and T2 for concurrent execution leads to

a. A serializable schedule
b. A schedule that is not conflict serializable
c. A conflict serializable schedule
d. A schedule for which a precedence graph cannot be drawn

2. If a schedule S can be transformed into a schedule S' by a series of swaps of non-conflicting instructions, then S and S' are

    a. Non-conflict equivalent
    b. Equal
    c. Conflict equivalent
    d. Isolation equivalent

3. The set of _____ in a precedence graph consists of all the transactions participating in the schedule

    a. Vertices
    b. Edges
    c. Directions
    d. None of the above

4. Which one of the following is NOT a part of the ACID properties of database transactions?

    a. Atomicity
    b. Consistency
    c. Isolation
    d. Deadlock-freedom

5. Which of the following statement/s is/are incorrect?

        I. A schedule following strict two phase locking protocol is conflict serializable as well as recoverable.
        II. Checkpoint in schedules are inserted to ensure recoverability.

    a. Only I
    b. Only II
    c. Both I and II
    d. None

6. Consider the following transactions T1, T2 and T3

T1	**T2**	**T3**
`read(X)`		
	`read(Y)`	
		`read(Y)`
	`write(Y)`	
`write(X)`		
		`write(X)`
	`read(X)`	
	`write(X)`	

Which one of the schedules below is the correct serialization of the above?

a. T1 --> T3 --> T2
b. T2 --> T1 --> T3
c. T2 --> T3 --> T1
d. T3 --> T1 --> T2

7. Which of the following scenarios may lead to an irrecoverable error in a database system?

a. A transaction writes a data item after it is read by an uncommitted transaction
b. A transaction reads a data item after it is read by an uncommitted transaction
c. A transaction reads a data item after it is written by a committed transaction
d. A transaction reads a data item after it is written by an uncommitted transaction

8. Which of the following is the most expensive method?

    a. Timestamping
    b. Plain locking
    c. Predicate locking
    d. Snapshot isolation

9. Consider the following partial schedule S involving two transactions T1 and T2.

T1	**T2**
`read(A)`	
`write(A)`	
	`read(C)`
	`write(C)`
	`read(B)`
	`write(B)`
	`read(A)`
	`commit`
`read(B)`	

Suppose that the transaction T1 fails immediately after the final read operation.

Which one of the following statements is correct?

a. T2 must be aborted and then both T1 and T2 must be re-started to ensure transaction atomicity
b. Schedule S is non-recoverable and cannot ensure transaction atomicity
c. Only T2 must be aborted and then re-started to ensure transaction atomicity
d. Schedule S is recoverable and can ensure atomicity and nothing else needs to be done

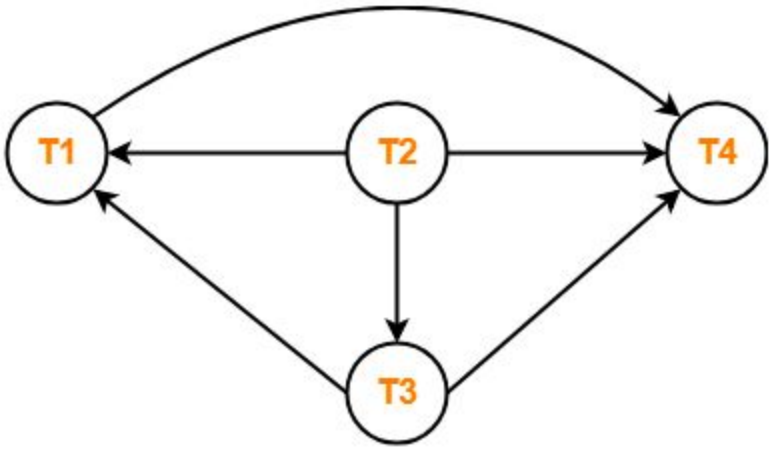
10. Consider the following schedule

Step	**T1**	**T2**	**T3**	**T4**
1		read(X)		
2			write(X)	
3			commit	
4	write(X)			
5	commit			
6		write(Y)		
7		read(Z)		
8		commit		
9				read(X)
10				read(Y)
11				commit

a. List all pairs of conflicting operations. **[6]**

- $R_2(X)$, $W_3(X)$
- $R_2(X)$, $W_1(X)$
- $W_3(X)$, $W_1(X)$
- $W_3(X)$, $R_4(X)$
- $W_1(X)$, $R_4(X)$
- $W_2(Y)$, $R_4(Y)$

b. Draw a dependency graph. **[5]**



c. Draw a conclusion regarding the conflict serializability and recoverability of the schedule. **[3]**

- No cycles
- Conflict serializable
- Hence, recoverable