Concurrency Homework

*Name*____ *Student ID*________________________

1) The first known correct software solution to the critical-section problem for two processes was developed by Dekker. The two processes, P_0 and P_1, share the following variables:

```
boolean flag[2]; /* initially false */
int turn;
```

The structure of Process P_i (i == 0 or 1) is shown on the next page. The other process is P_j (j == 1 or 0). Argue that this algorithm satisfies the three goals: safety, progress, and bounded waiting.

```
do {
     flag[i] = TRUE;

     while (flag[j]) {
          if (turn == j) {
               flag[i] = FALSE;
               while (turn == j)
                    ; // do nothing
               flag[i] = TRUE;
          }
     }

     // CRITICAL SECTION

     turn = j;
     flag[i] = FALSE;

     // REMAINDER SECTION
} while (TRUE);
```

2) Why are spinlocks not used on uniprocessor systems?

3) For the following schedule, tell whether it is conflict serializable or not.

   a) *T1:R(X), T2:R(X), T1:R(Y), T2:W(X), T1:W(Y), T2:R(Y), T1:Commit, T2:Commit*

4) (4 points) Fill in the below table.

Fill in the below table using timestamp protocol. Assume the timestamp of the transaction is the same as the Transaction ID. Identify which transactions complete, and which are rolled back. Once a transaction has been rolled back, you do not have to restart it.

T1	T2	T3	T4	R-TS(Q)	W-RS(Q)	R-TS(R)	W-TS(R)
				0	0	0	0
R(Q)							
		R(Q)					
			W(Q)				
	R(R)						
	W(R)						
W(Q)							
R(R)							
	W(R)						
		W(Q)					
			R(Q)				
	W(R)						
			W(Q)				

5) *(4 points) Give a short answer to the following question.*

Given the following schedule, show the locks that will occur and the subsequent schedule. Assume that strict 2PL is in effect, with no deadlock prevention and no starvation prevention. Assume that upgrading locks are allowed. Assume that requests will be satisfied in the order of arrival if possible.

T1:R(X), T2:R(Q), T3:R(Q), T(2):R(X), T3:R(X), T2:W(X), T2:Commit, T3:Abort, T1:W(X), T1:Commit

T1	T2	T3