Transaction Practice Questions

Question:
Draw the serializability (precedence) graphs for schedules given below, and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s).
S1: r1 (X); r2 (Z); r1 (Z); r3 (X); r3 (Y); w1 (X); w3 (Y); r2 (Y); w2 (Z); w2 (Y);
S2: r1 (X); r2 (Z); r3 (X); r1 (Z); r2 (Y); r3 (Y); w1 (X); w2 (Z); w3 (Y); w2 (Y);
S3:r1(X); r3(X); w1(X); r2(X); w3(X);

Question:
Consider schedules *S*3, *S*4, and *S*5 below. Determine whether each schedule is strict, cascadeless, recoverable, or nonrecoverable. (Determine the strictest recoverability condition that each schedule satisfies.)
*S*3: *r*1 (*X*); *r*2 (*Z*); *r*1 (*Z*); *r*3 (*X*); *r*3 (*Y*); *w*1 (*X*); *c*1; *w*3 (*Y*); *c*3; *r*2 (*Y*); *w*2 (*Z*); *w*2 (*Y*); *c*2;
*S*4: *r*1 (*X*); *r*2 (*Z*); *r*1 (*Z*); *r*3 (*X*); *r*3 (*Y*); *w*1 (*X*); *w*3 (*Y*); *r*2 (*Y*); *w*2 (*Z*); *w*2 (*Y*); *c*1; *c*2; *c*3;
*S*5: *r*1 (*X*); *r*2 (*Z*); *r*3 (*X*); *r*1 (*Z*); *r*2 (*Y*); *r*3 (*Y*); *w*1 (*X*); *c*1; *w*2 (*Z*); *w*3 (*Y*); *w*2 (*Y*); *c*3; *c*2;

Question:
How many *serial* schedules exist for the three transactions in Figure given below? What are they? What is the total number of possible schedules?

Transaction T_1
read_item(*X*);
write_item(*X*);
read_item(*Y*);
write_item(*Y*);

Transaction T_2
read_item(*Z*);
read_item(*Y*);
write_item(*Y*);
read_item(*X*);
write_item(*X*);

Transaction T_3
read_item(*Y*);
read_item(*Z*);
write_item(*Y*);
write_item(*Z*);

Question:
Why is an explicit transaction end statement needed in SQL but not an explicit begin statement?

Question:
Prove that the basic two-phase locking protocol guarantees conflict serializability of schedules. (*Hint*: Show that if a serializability graph for a schedule has a cycle, then at least one of the transactions participating in the schedule does not obey the two-phase locking protocol.)

Question:
What is the two-phase locking protocol? How does it guarantee serializability?

Question:
What are some variations of the two-phase locking protocol? Why is strict or rigorous two-phase locking often preferred?

Question:
Describe the wait-die and wound-wait protocols for deadlock prevention.