8(A) ISOLATION LEVELS

Consider a table Item(name, price) where name is a key. Suppose initially there are two tuples in Item: ('a', 20) and ('b', 30). Consider the following two concurrent transactions, each of which runs once and commits. You may assume there are no other transactions in the system and that individual statements execute atomically.

T1: begin transaction

S1: insert into Item values ('c', 40)

S2: update Item set price = price + 30 where name='c'

commit

T2: begin transaction

S3: select avg(price) as p1 from Item

S4: select avg(price) as p2 from Item

commit

Suppose that transaction T1 executes with isolation level serializable.

1. If transaction T2 also executes with isolation level serializable, what are all the possible pairs of values p1 and p2 returned by T2?
2. If transaction T2 executes with isolation level repeatable read, what are all the possible pairs of values p1 and p2 returned by T2?
3. If transaction T2 executes with isolation level read committed, what are all the possible pairs of values p1 and p2 returned by T2?
4. If transaction T2 executes with isolation level read uncommitted, what are all the possible pairs of values p1 and p2 returned by T2?