CS3402 Tutorial 8:

1. Which of the following schedules is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules.

   (a) $r_1(X); r_3(X); w_1(X); r_2(X); w_3(X);$
   (b) $r_1(X); r_3(X); w_3(X); w_1(X); r_2(X);$
   (c) $r_3(X); r_2(X); w_3(X); r_1(X); w_1(X);$

2. Consider the following concurrent schedule. Draw the serialization graph for the schedule. Is it conflict serializable?

Ta	Tb	Tc
	Read(x)	
Write(y)		
		Read(y)
	Write(y)	
Write(x)		
	Commit	
		Write(z)
Commit		
		Commit

3. Consider the following concurrent schedule. Draw the serialization graph for the schedule. Is it conflict serializable?

Ta	Tb	Tc	Td
	Read(z)		
			Read(z)
			Write(z)
Write(y)			
		Read(z)	
	Write(y)		
		Read(y)	
Write(x)			
	Commit		
Commit			
		Commit	
			Commit

4.　Consider two transactions as specified below:

T1: Read1(x); x:= x - 1; y:= x - 1; Write1(y)

T2: Read2(y); y:= y + 1; x:= y + 1; Write2(x)

If the initial values of x and y in the database are 5 and 10 respectively, give the final values of x and y for each schedule below.

(1)Read2(y); y:= y + 1; x:= y + 1; Write2(x); Read1(x); x:= x - 1; y:= x - 1; Write1(y).

(2)Read1(x); x:= x - 1; y:= x - 1; Read2(y); y:= y + 1; x:= y + 1; Write1(y); Write2(x).

(3)Read1(x); x:= x - 1; y:= x - 1; Write1(y); Read2(y); y:= y + 1; x:= y + 1; Write2(x).

(4)For the above three schedules, which schedules are correct, and which are wrong? Briefly explain your answer.

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1. **Answer**:
   (a) Not conflict serializable
   (b) Not conflict serializable
   (c) Conflict serializable; it is equivalent to this serial schedule:
       r2(X); r3(X); w3(X); r1(X); w1(X); (or you can simply write T2, T3, T1)
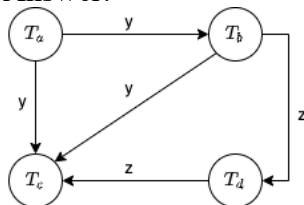
   (Comment: the detailed explanation is omitted here but you need to explain the details when you answer questions in the final exam.)

2. **Answer**:
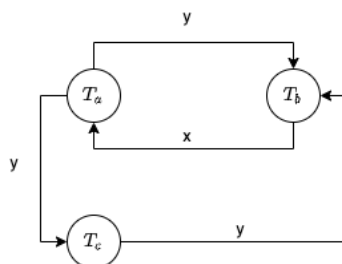
   It is not serializable as the schedule is cyclic.

3. Answer:

   It is serializable since there's no cycle.
   The equivalent serial schedule is:
   Ta -> Tb -> Td -> Tc

4. (1) Answer: x=12, y=10
   (2) Answer: x=12, y=3
   (3) Answer: x=5, y=3

(4) Answer: (1) and (3) both are correct. Since they are serial schedules. Serial schedules can maintain the database consistency. (2) is wrong, because it is not equivalent to any serial schedule.