I. ① Recoverable schedule?

② Simple Two-way Merge Sor + example + cost?

II.

	T1	T2	T3
①	lock-X(A) R(A) W(A)		
		lock-X(B R(B) W(B)	
			lock-X(C) R(C) W(C)

Is this exec. posible under Strict 2PL? Justify!

② la fel ca pe exemplu

③ la fel ca pe exemplu

④ R1[ID, C1, C2, C3]

R2[ID, C7, C9, ID Rel 1]

R1: 100.000 records, 40 records / page

R2: 10.000 records, 50 records / page

a) 100 Buffer Pages available

$R1 \overset{R2}{\otimes}_{Rel1.ID = Rel2.ID Rel1}$

Cost with: - sort merge join
- hash join
- page oriented nested loops join ?

b) R1 fragmented: ID, C1 stored at Cluj
ID, C2, C3 stored at Bucharest

Describe eval of the query:

```
SELECT AVG(C2)
FROM R1
WHERE C1>=9
```

III ① To prevent SQL injection attack:
a) data validation is performed with regular expressions
b) statements are parameterized
c) string separators are preceded with "\"
d) users are added nicely not to commit an attack
e) none

② T1 and T2 are 2 concurrent transactions. The final result of their execution must be identical to the result obtained when executing:
a) only T1
b) only T2
c) either T1 or T2, but not both
d) T1 followed by T2, or T2 followed by T1
e) none of the above answers is correct

③ In the strict 2PL protocol:

a) locks are never used

b) locks are used to control concurrent access to data

c) transaction T can ask for a new lock after it released a lock

d) all the locks of a transaction are released when it completes execution

e) none

④ The system crashes at time t. The REDO phase of ARIES:

a) identifies all the active transactions at time t

b) brings the DB to the state it was in at time t

c) undoes the changes of transactions that were active at time t

d) ARIES doesn't include a REDO phase

e) none

⑤ In vertical fragmentation

a) the reconstruction operator is the natural join

b) ~~_____~~ union

c) fragmentation is performed with projection

d) ~~_____~~ " ~~_____~~ selection

e) none

⑥ In primary site replication
a) changes to secondary copy are propagated to the primary copies
b) —— primary ——————————
secondary ——
c) The Capture ~~stop~~ step can be implemented using the log
d) ———————— can't ————————
e) none

⑦ Which of the following factors must be considered when choosing an alg. for a relational operator?
a) sizes of relations
b) existence of indexes
c) existence of sorting orders
d) size of the available buffer pool
e) none

⑧ I is an index with search key <a, b>
a) I hash index, I matches a=7 ∧ b=10
b) I hash index, I matches a=7 ∧ b=10 ∧ c<2
c) ———————— // —— a<9 ∧ b<10 ∧ c<2 ∧ d<10
d) I B+tree index, I matches a=7 ∧ b<10
e) none

(9) Under READ COMMITTED

a) dirty reads occur

b) —"— NOT —"—

c) ~~no~~ nonrepeatable reads occur

d) —"— NOT —"—

e) none

(10) Consider

Select *
F R
W R.C > 'U%'

The cost is:

a) 9 I/O

b) 90

c) 1/90

d) 1/9

e) none

(11) When undoing the change of an Update log record:

a) a Commit log record is written on ~~disk~~ the log

b) Abbor —"—

c) Compensation —"—

d) no log records written

e) none

(12) % data replication:

a) voting = sync.

b) voting = Async.

c) P2P = sync. (peer-to-peer)

d). P2P = Async

e) none

(13) Which of the alg. below uses indexing technique

a) sort-merge-join

b) index nested loops join

c) page-oriented nested loops join

d) hash join

e) none

(14) System catalog maintain at least:

a) relation cardinality and size

b) index ——— 11 ———

c) index transcendence

d) index height

e) none