Indian Statistical Institute

PGDBA, First Year, Mid-Sem of First Semester Examination, 2020-21

Fundamentals of Database Systems

Answer Keys

1. (a) We can disprove this with the following counterexample.
Let R_1 =

A	B	C
1	2	3

and R_2 =

A	B	C
1	2	3

$R_1 - R_2$ returns no tuple, however, assuming X = AB returns one tuple for $R_1 \div \pi_X(R_2)$.
(b) As there is no attribute common between R_1 and R_2, this will be the same as Cartesian product. However, the further projection will yield the minimum and maximum number of tuples as 1 and $t1$, respectively.
2. (a) (i) It is valid denoting total participation with no limit.
(ii) It is valid denoting total participation with maximum cardinality.
(iii) It is invalid because we cannot use '0' as the maximum cardinality.
(b) Here are the errors.
- name cannot be derived in ALBUM
- name cannot be the primary key in PRODUCER where PRODUCER is a weak entity set
3. (a) Anyone of the following will work.
- select sum(F)/count(F) as avg_F from R;
- select sum(F)/count(*) as avg_F from R;
(b) Here follows the trigger. Note that, "before insert" will also work.

```
delimiter //
create trigger EVENT_DISTRIBUTE_AFTER_INSERT
after insert on GRAND
for each row
begin
        if new.event = 'Wimbledon' then
                insert INTO WIMBLEDON values(new.year, new.name, new.nationality);
        end if;
        if new.event = 'Australian Open' then
                insert INTO AUSTRALIAN values(new.year, new.name, new.nationality);
        end if;
        if new.event = 'French Open' then
                insert INTO FRENCH values(new.year, new.name, new.nationality);
        end if;
        if new.event = 'US Open' then
                insert INTO US values(new.year, new.name, new.nationality);
        end if;
end //
delimiter ;
```

4. (a) (i) This is the same as natural join, hence the size will be min(($t1$*$t2$)/$d1$, ($t1$*$t2$)/$d2$).
(ii) This is natural join added with some tuples in R_1, hence the size will be min(($t1$*$t2$)/$d1$, ($t1$*$t2$)/$d2$) + $t1$.
(iii) We cannot perform the operation as $A(R_1) \neq A(R_2)$, hence the size will be 0.
(b) Here follows an example.
R_1

A	B	C
1	1	3
2	2	3

R_2

A	B	C
1	3	3
3	1	4

$\sigma_{B=1} (R_1 \cup R_2)$

A	B	C
1	1	3
3	1	4

$\sigma_{B=1} (R_1) \cup R_2$

A	B	C
1	1	3
1	3	3
3	1	4