3. Consider the tables **student** and **course** as shown below.

ID	name	dept_name
21f11	Ram	CS
21f12	Rakesh	ME
21f13	Pranav	EE
21f14	Rajib	CS
21f15	Vikash	BT

Table 3: **student**

course_id	title	dept_name
C001	DBMS	CS
C002	CAD	ME
C003	Digital	EE
C004	PDSA	CS

Table 4: **course**

How many rows are returned by the below query?

```
SELECT ID FROM student,course
EXCEPT ALL
SELECT ID FROM student
EXCEPT ALL
SELECT ID FROM student
```

7. Consider the tables **Employee** and **Manager** as shown below:

EmpID	Name	Age
1	Percy	16
2	Jason	17
3	Nico	14
4	Leo	15
5	Frank	16

Table 7: **Employee Table**

Manager ID	Name	Age
5	Annabeth	20
2	Piper	18
3	Hazel	19

Table 8: **Manager Table**

How many tuples will be there as a result of the following query?

```
SELECT EmpID
FROM   Employee
WHERE  Employee.Age > ALL (SELECT Manager.Age
                           FROM
                           Manager
                           WHERE  Manager.Name = 'Rayna'))
```

```
CREATE TABLE insurance (ins_id varchar(20) primary key,
policyHolderName varchar(20) not null,
age int not null, premium int not null )

CREATE TABLE nominee (nominee_id varchar(20) primary key,
NomineeName varchar(20), relationship varchar(20), ins_id
varchar(20), foreign key (ins_id) references
insurance(ins_id) ON DELETE CASCADE)
```

The instance of the table **insurance** and **nominee** is as shown below:

ins_id	policyHolderName	age	premium
INS004	Ramesh	28	9800
INS002	Sumesh	29	8800
INS003	Suresh	33	12200
INS004	Rajesh	31	11100

Table 9: insurance

nominee_id	NomineeName	relationship	ins_id
NM001	Shakti	Wife	INS001
NM002	Mukti	Wife	INS002
NM003	Yukti	Daughter	INS003

Table 10: nominee

The following SQL query is executed:

```
delete from insurance where ins_id = 'INS001'
```

What will be the value of x, if x represents the total number of rows in **insurance** and **nominee** table counted together?

```
CREATE TABLE insurance (ins_id varchar(20) primary key,
policyHolderName varchar(20) not null,
age int not null, premium int not null )

CREATE TABLE nominee (nominee_id varchar(20) primary key,
NomineeName varchar(20), relationship varchar(20), ins_id
varchar(20), foreign key (ins_id) references
insurance(ins_id) ON DELETE CASCADE)
```

The instance of the table **insurance** and **nominee** is as shown below:

ins_id	policyHolderName	age	premium
INS001	Ramesh	28	9800
INS002	Sumesh	29	8800
INS003	Suresh	33	12200
INS004	Rajesh	31	11100

Table 9: insurance

nominee_id	NomineeName	relationship	ins_id
NM001	Shakti	Wife	INS001
NM002	Mukti	Wife	INS002
NM003	Yukti	Daughter	INS003

Table 10: nominee

The following insert statements are executed in the given sequence.

```
insert into insurance values ('INS005', 'Rakesh', 24, 7000);
insert into nominee values ('NM004', 'Sonu', 'Son', 'INS005');
insert into nominee values ('NM004', 'Suman', 'Wife', 'INS004');
insert into nominee values ('NM004', 'Monu', 'Son', 'INS005');
insert into nominee(nominee_id, ins_id) values ('NM010','INS005');
```

What will be the output of the below query?

```
SELECT * FROM nominee
```

```
CREATE TABLE insurance (ins_id varchar(20) primary key,
policyHolderName varchar(20) not null,
age int not null, premium int not null )

CREATE TABLE nominee (nominee_id varchar(20) primary key,
NomineeName varchar(20), relationship varchar(20), ins_id
varchar(20), foreign key (ins_id) references
insurance(ins_id) ON DELETE CASCADE)
```

The instance of the table **insurance** and **nominee** is as shown below:

ins_id	policyHolderName	age	premium
INS001	Ramesh	28	9800
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INS003	Suresh	33	12200
INS004	Rajesh	31	11100

Table 9: insurance

nominee_id	NomineeName	relationship	ins_id
NM001	Shakti	Wife	INS001
NM002	Mukti	Wife	INS002
NM003	Yukti	Daughter	INS003

Table 10: nominee

The information about the insurance policy holder having a premium greater than 9000 is stored in a VIEW by name **premiumholder**. The SQL query is shown below:

```
create view premiumholder as
select * from insurance natural join nominee
where premium > 9000
```

What will be the output of relational algebra expression shown below?

$\Pi_{nomineename}(\sigma_{age>25}(premiumholder))$

8. Consider the following relational schema:
Passenger *(P_id, P_name, B_id)*
Pilot *(Pilot_id, Pilot_name, Flight_No)*
Bookings *(Booking_id, Boarding, Destination, Flight_no, P_id, Pilot_id)*

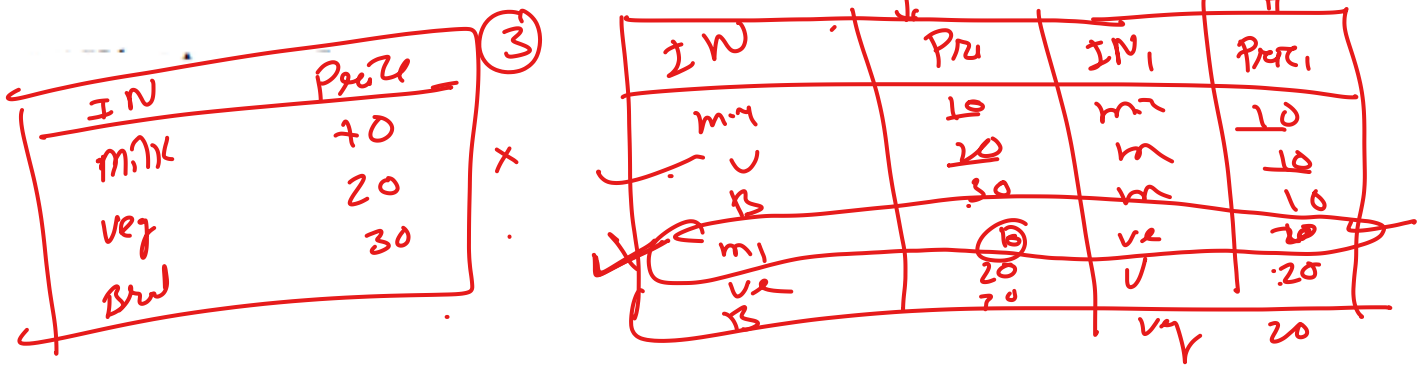
Choose the suitable query that will find the names of all passengers who flew from New York with pilot named James Wan in flight number 3005.

(1) $\Pi_{P\_name}(Passenger \bowtie \Pi_{P\_id}(\sigma_{Boarding='NewYork' \wedge Flight\_No='3005' \wedge Pilot\_name='James\ Wan'}(Pilot \bowtie Bookings)))$

○ $\Pi_{P\_name}(Passenger \bowtie \Pi_{Pilot\_name}(\sigma_{Boarding='NewYork' \wedge Flight\_No='3005' \wedge Pilot\_name='James\ Wan'}(Pilot \bowtie Bookings)))$

○ $\Pi_{P\_name}(Passenger \bowtie \Pi_{P\_id}(\sigma_{Boarding='NewYork' \wedge Flight\_No='3005' \wedge Pilot\_name='James\ Wan'}(Passenger \bowtie Bookings)))$

○ $\Pi_{P\_name}(Passenger \bowtie \Pi_{P\_id}(\sigma_{Destination='NewYork' \wedge Flight\_No='3005' \wedge Pilot\_name='James\ Wan'}(Pilot \bowtie Passenger)))$



Consider the following relation **Items**:

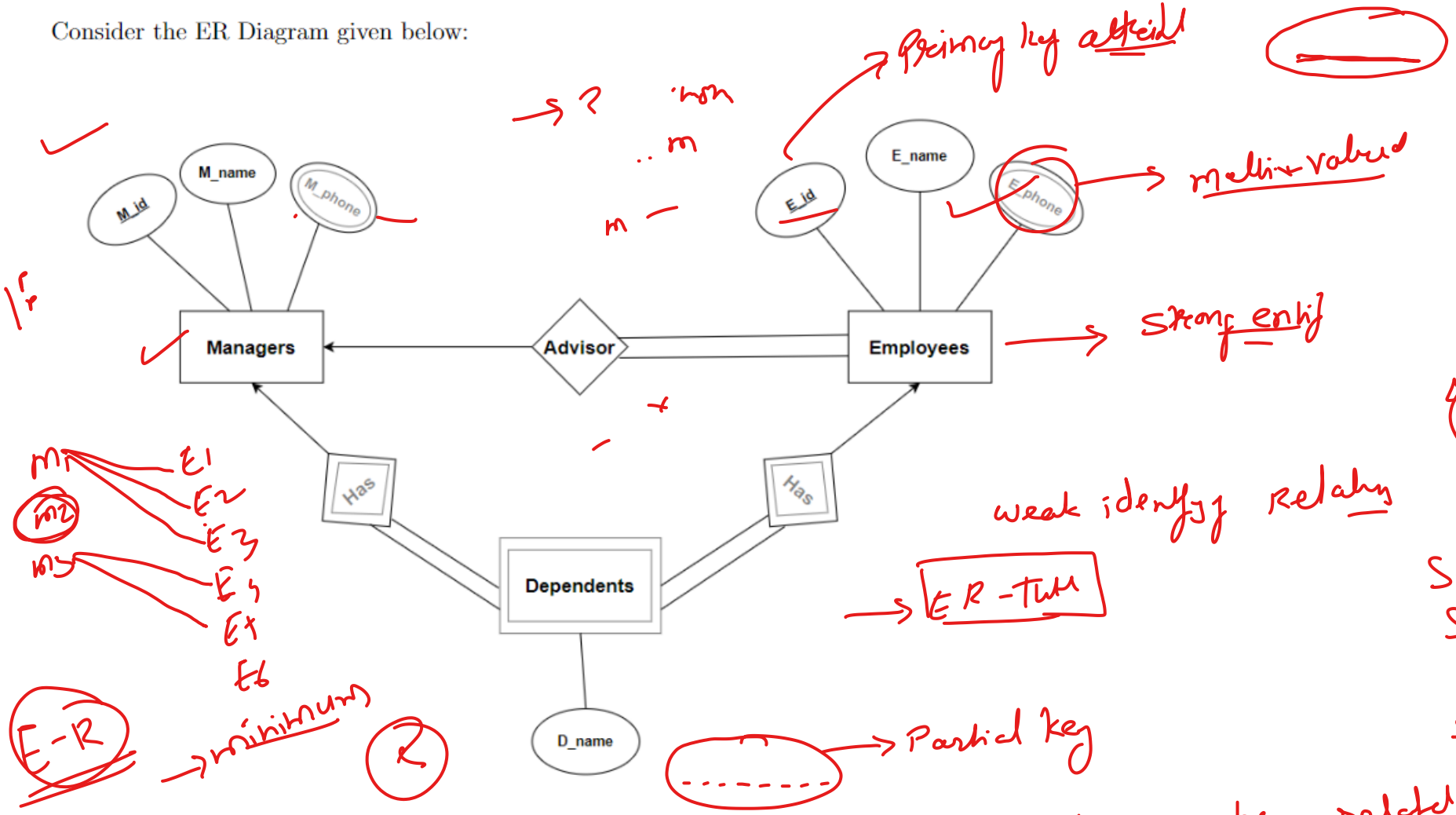
Items(*item_name*, *item_type*, *brand*, *price*)

There is at least one item each in the 'Food' and 'Beverage' categories. What will the following relational algebra expression imply?

$$\Pi_{item\_name}(\sigma_{(item\_type='Food' \wedge brand='Amul')}(Items)) -$$
$$\Pi_{item\_name}(Items \times_{(item\_type='Food' \wedge brand='Amul' \wedge q='beverage' \wedge price<=s \wedge r='Keventer')} \rho_{(p,q,r,s)}(Items))$$

- ○ Names of all food items from brand Amul that have lower prices than all beverage items from brand Keventer
- ∨ Names of all food items from brand Amul that have higher prices than all beverage items from brand Keventer
- ○ Names of all food items from the brand Keventer that have higher prices than all beverage items from the brand Amul
- ○ Names of all beverage items from brand Amul that have lower prices than all food items from brand Keventer

Consider the ER Diagram given below:



Which of the following statement(s) is/are true?

1. F.D
2. closure of an attribute
3. Candidate key & superkey
4. Prime attribute & NPA
5. Lossless decomposition
6. dependency Preserving

* Week 5 & week 6
  - ↳ Normalization

week 2 – 6 } → 80%
week 9 – 11 }

3. Consider the following table:

PlayerID	PlayerName	Team	Runs
001	Virat	India	100
002	Rohit	India	100
003	Smith	Australia	70
004	Jason	England	60
005	Rohit	Bangladesh	65
006	Asif	Pakistan	50
007	Smith	Newzealand	70

Table 1: **Players**

Which of the following functional dependencies hold in the **Players** table?

- ◯ $PlayerID \rightarrow PlayerName$
- ◯ $PlayerName \rightarrow Runs$
- ◯ $PlayerName \rightarrow Team$
- ◯ $Runs \rightarrow PlayerID$

$\mathbf{R}(A, B, C, D, E, F, G)$
$F = \{A \rightarrow B, C \rightarrow E, D \rightarrow EF, B \rightarrow D, F \rightarrow G\}$

1. What is the total number of superkeys present in relation **R**?

- ○ 31
- ○ 32
- ○ 29
- ○ 33

AC & BD

AC BD

A: $2^{7-2} = 32$

CD: $2^{7-2} = 32$

$n(A \cap B) = n(A) + n(B) - n(A \cup B)$
$= 32 + 32 - 8$
$= 56$

2^{n-m}
$2^{7-3} = 8$

AC → C.K S.K

Combinations of C.K with any attributes

n :- Total no. of attributes = 7

m :- no. of attributes in C.K = 2

$2^{7-2} = 2^5 = 32$

$(AC)^+ = \{AC\ BED\ FG\} = R$

ACF
ACG

AC

Prime attribute :- attribute part of C.K
A ∈ C

NPA :- remaining attrib not part of C.K
B, D, E, F, G

R(A, B, C, D, E, F, G)

$R_1 \cup R_2 \cup R_3 =$

2. Consider the relation **R** to be decomposed into the following decompositions:

$D_1 = (A,B), (A,C,D,E), (E,F,G)$

$D_2 = (A,B,C,D,E), (D,E,F), (F,G)$

Choose the correct option(s): [MSQ: 4 Marks]

- D_1 is lossy but dependency preserving
- D_2 is lossless but not dependency preserving
- D_1 is lossy but not dependency preserving
- D_2 is lossless but dependency preserving

Lossless decomposition

1. $R_1 \cup R_2 = R$
2. $R_1 \cap R_2 \neq \phi \rightarrow$ (common)$^+$
3. $R_1 \cap R_2 \rightarrow R_1$ or R_2

$R_1 = (A B)$, $R_2 (A C D E)$, $R_3 (E F G)$

$F_1 = \{A \rightarrow B\}$

$F_2 = \{C \rightarrow E, D \rightarrow E, A \rightarrow DE\}$

$F_3 = \{F \rightarrow G\}$

R_{23}

$(B)^+$

$(D)^+ = \{DE\}$

$D \rightarrow F$

$B \rightarrow D$

$F_1 \cup F_2 \cup F_3$

$A \rightarrow B$

$B \rightarrow C$, $C \rightarrow D$, X

$ABCD \rightarrow E$

$A^+ = \{ABCD\}$

$R_1 = (A B, (D, E)$, $R_2 (D E F)$, $R_3 = FG$

$F_1 = \{A \rightarrow B, C \rightarrow E, D \rightarrow E, B \rightarrow D\}$

$F_2 = \{D \rightarrow EF\}$

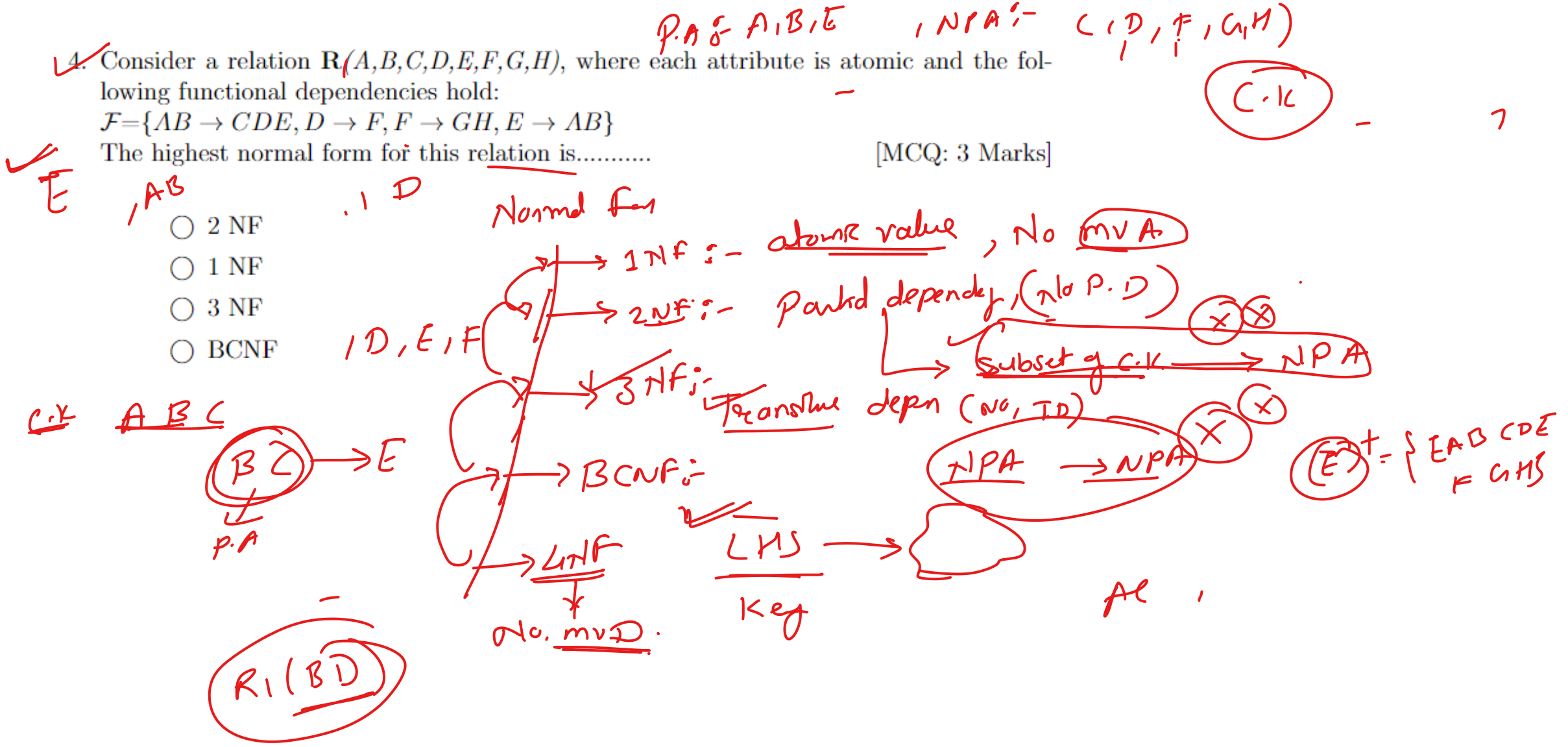
$F_3 = \{F \rightarrow G\}$

Weeks + Tutorial

$F_1 \cup F_2 \cup F_3$

4. Consider a relation **R**(A,B,C,D,E,F,G,H), where each attribute is atomic and the following functional dependencies hold:
$\mathcal{F}=\{AB \rightarrow CDE, D \rightarrow F, F \rightarrow GH, E \rightarrow AB\}$
The highest normal form for this relation is..... [MCQ: 3 Marks]

- ○ 2 NF
- ○ 1 NF
- ○ 3 NF
- ○ BCNF



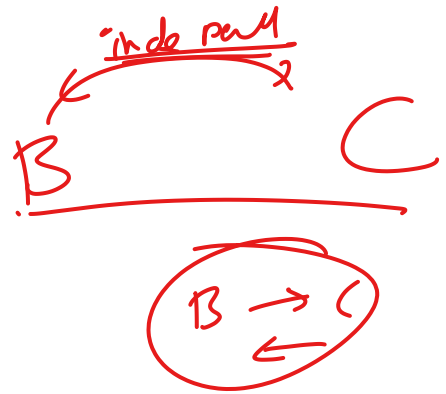
Normalization

C.K → P.A

N.P.A

A → B

A



B → C

C → B

14. Consider a relation **CustomerLogs**(*Name*, *Items*, *Restaurant*, *Date*) with the following data values.

Name	Items	Restaurant	Date
Zury	Coffee	Your's cafe	19-10-21
Zury	Tea	Our's cafe	21-10-21
Zury	Tea	C	E
Zury	A	B	D

If multivalued dependency (*Name* $\rightarrow\!\!\rightarrow$ {*Items*, *Date*}) exists in the above **CustomerLogs** relation, then what are the values of A, B, C, D, E?

- ○ A = Tea, B = Your's cafe, C = Our's cafe, D = 21-10-21, E = 19-10-21
- ○ A = Coffee, B = Your's cafe, C = Our's cafe, D = 21-10-21, E = 19-10-21
- ○ A = Coffee, B = Our's cafe, C = Your's cafe, D = 19-10-21 , E = 21-10-21
- ○ A = Tea, B = Our's cafe, C = Your's cafe, D = 19-10-21, E = 21-10-21

Construct a binary search tree by inserting the following elements in the given order 30,20, 27, 86, 103, 25, 60, 90, 10, 15. Find out the elements present in the leaf nodes of the constructed binary search tree.
Choose the correct option.

- 15, 25, 60,90
- 15, 25,90
- 10,27,103, 20,86
- 10,27,103