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1) Propotional Logic:-

A → "Carla goes to the party"
B → "Diana goes to the party"
C → "Mario goes to the party"
D → "Bruno goes to the Party"

Formulize the given sentene:-

1) $D \rightarrow \neg A \longrightarrow \varphi_1$

2) $(\neg D \vee C) \vee (D \wedge C) \longrightarrow \varphi_2$

3) $C \longrightarrow B \longrightarrow \varphi_3$

4) $A \rightarrow \neg B \longrightarrow \varphi_4$

5) $(A \vee B) \wedge (C \vee D)$ (The party is over atleast one female and male fried are going $\rightarrow \phi$

Lets try resolving above Equations:-

φ_1: $D \rightarrow \neg A \equiv \boxed{(\neg D \vee \neg A)}$

φ_2: $\boxed{(D \vee C) \vee (D \wedge C)}$

φ_3: $C \rightarrow B \equiv \boxed{\neg C \vee B}$

φ_4: $A \rightarrow \neg B \equiv \boxed{\neg A \vee \neg B}$

Claes of $\varphi_1, \varphi_2, \varphi_3, \varphi_4$ are

1) $\neg D$ } φ_1
2) $\neg A$
3) D, C } φ_3
4) D, C
5) $\neg C$ } φ_3
6) B
7) $\neg A$ } φ_4
8) $\neg B$

To find whether the party will happen or not the $\varphi_1, \varphi_2, \varphi_3$ and φ_4 thould satisfy ϕ. where ϕ is $(A \vee B) \wedge (D \vee C)$

$\therefore$ When the party is over when one male and female friend are going.

The $\varphi_1, \varphi_2, \varphi_3$ and φ_4 are consitent because If they are not the every formula φ_n is a logical conceauence of them.

There are total 5 contrails. ($\varphi_1, \varphi_2, \varphi_3, \varphi_4$ ϕ)

The prety will be there only if it is satisficator i,e. There is atteast one interpration that can all the concidared

$(\varphi_1 \wedge \varphi_2 \wedge \varphi_3 \wedge \varphi_4 \wedge \varphi_5$ is $T)$.

$(A \vee B) \vee (C \vee D) \Rightarrow$ 9) A B }
10) C D

②

Considering the above, statements considering is we consider the following interpretation. i.e. $A' = F$, $B' = T$, $C' = T$ and $D' = T$. Then the given logic is true to it satesfiable (ie) for the above the given logic is true and is satisfiable hence.

interatain $\varphi_1 \wedge \varphi_2 \wedge \varphi_3 \wedge \varphi_4 \wedge \varphi_5 \rightarrow T$ and is satisfiable hence.

the party will be there

only if carla does not goes to the party.

5) <u>Relational Logic</u>:-

Given that the Harbrand universe with two constraints and the predicates P and Q.

1) $\forall x \cdot P(x) \rightarrow \exists (y) \cdot P(y)$

2) $\forall x \cdot \exists y \cdot Q(x, y) \rightarrow \exists x \cdot \forall y \cdot (x, y)$

3) $\exists y \cdot P(y) \longrightarrow \forall x \cdot P(x)$

4) $\forall x \cdot \forall y \ (x, y) \rightarrow \exists x \cdot P(x)$

5) $(\forall x \cdot (P(x) \rightarrow \exists y \, Q(x, y)) \wedge \exists z \cdot P(z)) \rightarrow \exists x \cdot \exists y \, Q(x, y)$

By showing the folloging formulae we are that in a party its satisfiable

1) $\forall x \cdot P(x) \xrightarrow{} \exists (y) \cdot P(y)$ (satisfied).

$x = y$

$\forall = z$

The logical constraints, the party of based in.

(ii) $\forall x \ \exists y \ \forall (x, y) \Rightarrow \exists x \forall y \, \forall (x, y)$. (Not satisfied)

$$\left.\begin{array}{l} \forall x = \forall y \\ \exists y = \exists x \end{array}\right\} \Rightarrow \text{Equation is solved.}$$

(iii) $\exists y \ P(y) \Rightarrow \forall x \cdot P(x)$. (Not satisfied).

$\exists y \approx \forall x \Rightarrow$ if possible.

(iv) $\forall x \forall y.\ \psi(x,y) \rightarrow \exists x P(x)$ (satesfied)

$\Downarrow$

Its Not possible.

(Not satesfied)

(v) $(\forall x (P(x) \rightarrow \exists (x,y)) \wedge \exists z.\ P(y)) -$

$\exists x\ \exists y.\ \bar{\psi}(\varphi_2, y)$

$\Downarrow$

Its Not Possible.

which is not propotional