Nishant Jindal

Conditional Statement

$q \leftrightarrow p$	$p \leftrightarrow q$	$p \to q$	p	q	$\sim p$	$p \vee q$	$p \wedge q$
T	T	T	T	T	F	T	T
F	F	F	T	F	F	T	F
F	T	T	F	T	T	T	F
T	F	T	F	F	T	F	F

If p then q, $p \to q$

$p \Rightarrow q$

p implies q

p or $q = p \vee q$ ↓ Connector

$p \to q$

$p \to q = \sim p \vee q$

p and $q = p \wedge q$

Negation of $p \to q$

$\sim(p \to q) = p \wedge \sim q$

Nishant Jindal

Biconditional Statement

$p \Leftrightarrow q$, $p \leftrightarrow q$ $\sim(p \wedge \sim q) \wedge \sim(\sim p \wedge q)$

p iff q , p if and only if q $(\sim p \vee q) \wedge (p \vee \sim q)$

De Morgan's Law

$\overline{A \cup B} = \bar{A} \cap \bar{B}$

$\overline{A \cap B} = \bar{A} \cup \bar{B}$

$p \leftrightarrow q$

Negation $p \leftrightarrow q$

$\sim(p \leftrightarrow q) = (p \wedge \sim q) \vee (\sim p \wedge q)$

$p \leftrightarrow q = (p \wedge q) \vee (\sim p \wedge \sim q)$

∴

Nishant Jindal

Contrapositive.

Contrapositive of $p \rightarrow q$ = $\sim q \rightarrow \sim p$

1: Negation of statement $(\sim p \vee q) \wedge (\sim p \wedge \sim q)$ is

(a) $(p \vee \sim q) \wedge (p \vee q)$

(b) $(p \wedge \sim q) \vee (p \vee q)$

(c) $(\sim p \vee q) \vee (\sim p \wedge \sim q)$

(d) $(p \wedge \sim q) \wedge (p \vee q)$

$(p \wedge \sim q) \vee (p \vee q)$

2. If $(p \wedge \sim q) \vee (\underbrace{q \wedge r}_{\text{True}})$ is true and q and r both true, then p is

(a) True (b) False (c) May be true or false

(d) None.

Tautology

Statement which is always true for all truth value

$p \vee \sim p \rightarrow$ Tautology

Fallacy (Contradiction)

which is false for all truth values.

$p \wedge \sim p \Rightarrow$ fallacy

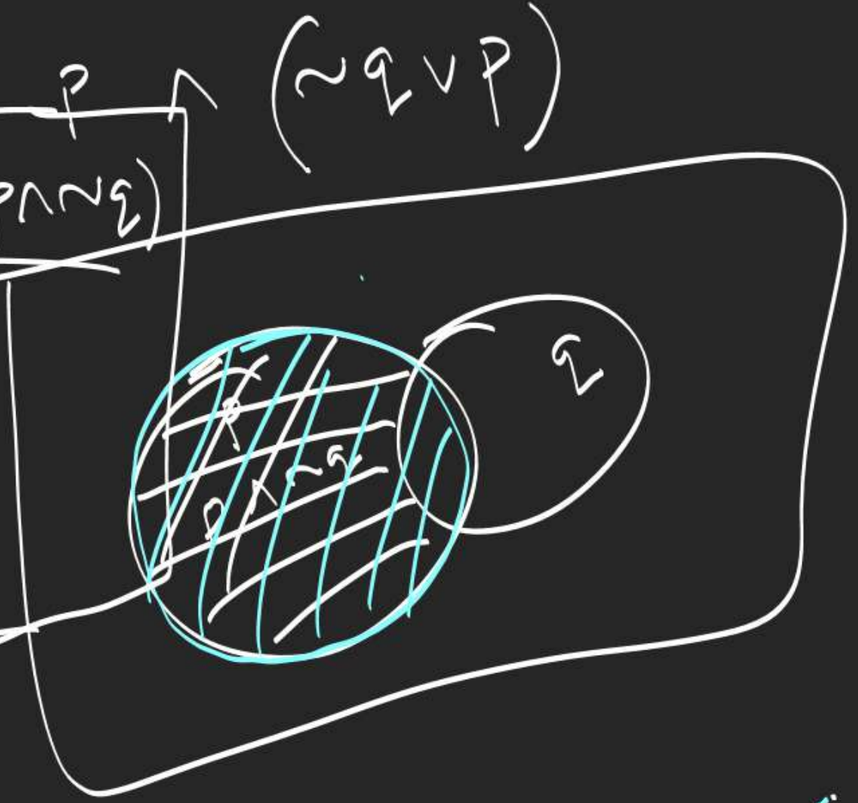
Nishant Jindal

3. The statement $(p \wedge \sim q) \vee p$ is logically equivalent to $= p$

(a) p (b) $\sim p$ (c) q (d) $\sim q$

$p \wedge (\sim q \vee p)$

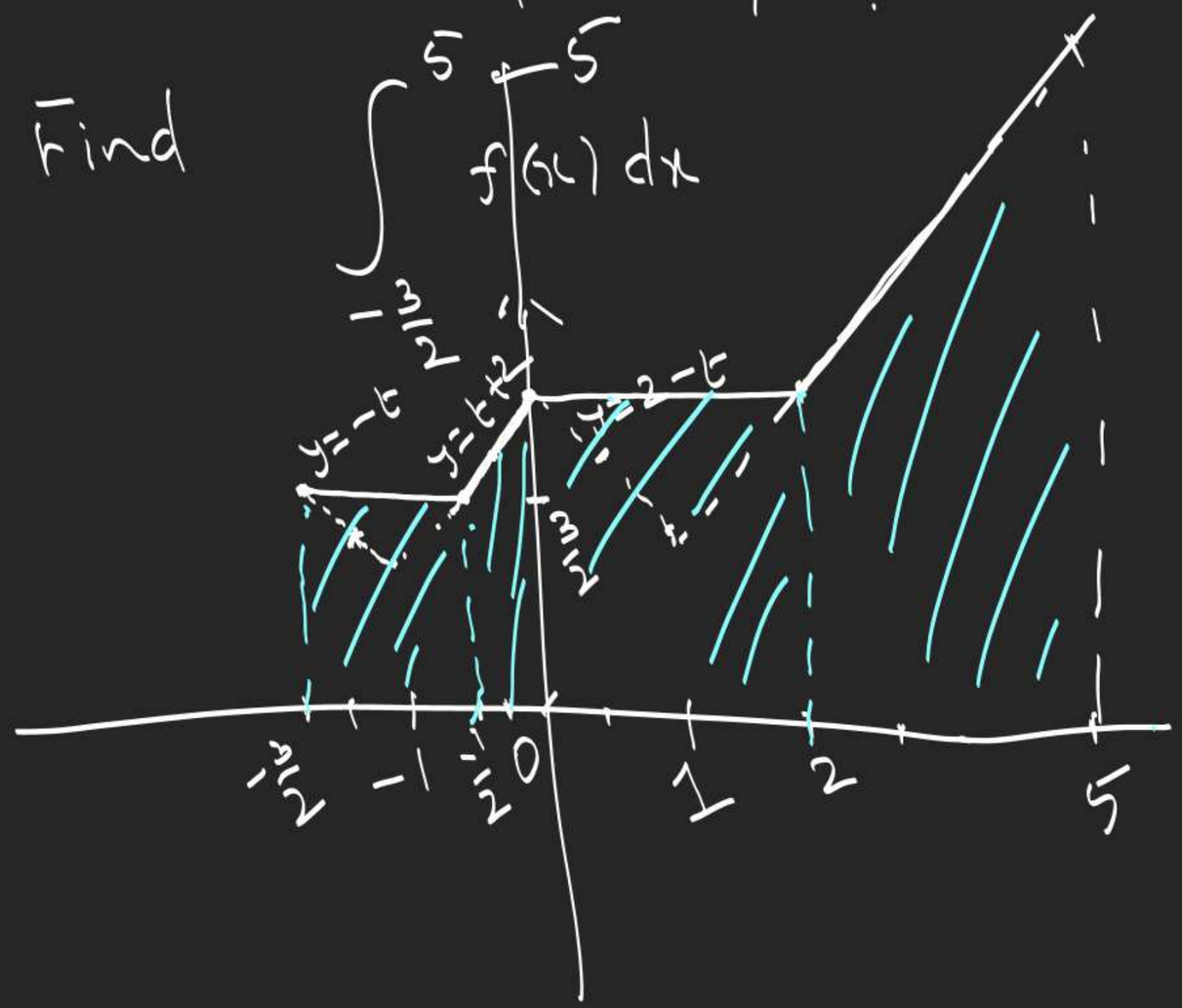
p	q	$\sim q$	$p \wedge \sim q$	$p \vee (p \wedge \sim q)$
T	T	F	F	T
T	F	T	T	T
F	T	F	F	F
F	F	T	F	F



4. Let $g(t) = |t-1| - |t| + |t+1|$ $\forall t \in R$ and

$$f(x) = \max\{ g(t) \mid -\tfrac{3}{2} \le t \le x \}, \quad x \in \left[-\tfrac{3}{2}, \infty\right)$$

Find $\int_{-\frac{3}{2}}^{5} f(x)\,dx$



$$1 \times \tfrac{3}{2} + \tfrac{1}{2} \times \tfrac{1}{2}\left(\tfrac{3}{2}+2\right) + 2 \times 2 + \tfrac{1}{2} \times 3 \times (2+5)$$

Ex-IV → DE

DPP 4, 5 → Probability

$$= \frac{135}{8}$$

∴