CS & IT ENGINEERING

Discussion notes

Discrete Mathematics

Mathematical Logic

DPP 04

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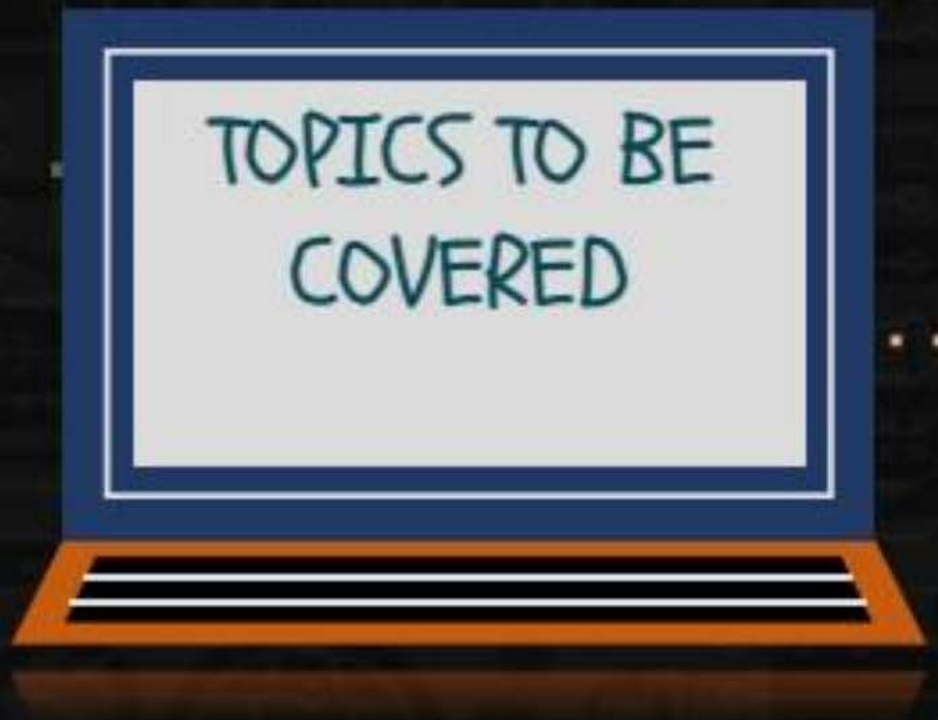


01 Question

02 Discussion

Q.1 Let R(x, y, z) denote the statement [MSQ]

"x + y = z" x + y = z.

Which of the following proposition will evaluate truth value True?

A. R(1,+2,=3) (T) ✓
   x y z

B. R(0,+0,=1) (F)

C. R(1,+1,=2) (T) ✓

D. R(2,+3,-4) (F)

Q.2 [MCQ]

Let $p(x)$, $q(x)$ denote the following open statements.

$p(x): x \leq 3$ $\quad$ $q(x): x + 1$ is odd

If the universe consists of all integers, what are the truth values of the following statements?

$S_1: \sim(p(-4) \vee q(-3))$

$S_2: \sim(p(-4) \wedge \sim q(-3))$

A. S_1 : True, S_2 : False

B. S_1 : False, S_2 : True

C. S_1 : True, S_2 : True

D. S_1 : False, S_2 : False

Q.3

Let $p(x)$, $q(x)$ denote the following open statements. **[NAT]**

$$p(x): x+1>x \qquad q(x): x^2>0$$

$2+1>2$

How many expressions evaluate to True?

I. $p(3) \vee [q(3) \vee \sim p(3)]$ (T)

$T \vee$

II. $p(2) \rightarrow [q(2) \rightarrow p(2)]$

$T \rightarrow (T \rightarrow T) \equiv T$

III. $[p(2) \rightarrow q(2)] \wedge p(-3)]$

$(T \rightarrow T) \wedge T \equiv T$

3

Q.4 [MSQ]

Consider the English sentence

"You can not ride the roller coaster if you are under 4 feet tall unless you are older than 16 years old".

Which of the following correctly represent the logical expression for the sentence?

A. $\neg q \vee \neg(R \wedge \neg S) \equiv \neg q \vee \neg R \vee S$; $q \rightarrow \sim(r \wedge \sim S)$

B. $(r \vee \sim S) \rightarrow q$

C. $(r \wedge \sim S) \rightarrow \sim q$

D. None of these

$(\neg q \text{ if } R) \text{ unless } S$

$\neg S \rightarrow (\neg q \text{ if } R)$

$\neg S \rightarrow (R \rightarrow \neg q)$

$S \vee \neg R \vee \neg q$

$P \rightarrow q$

q unless $\neg p$

q if $p = p \rightarrow q$

Q.5

[MCQ]

Let $p(x)$ be the statement

"$x + 1 > x$"

Now, consider the truth value of quantification, where the domain consists of all real number.

$$L_1 = \forall x\, p(x) \quad (F)$$

$$L_2 = \exists x\, p(x) \quad (T)$$

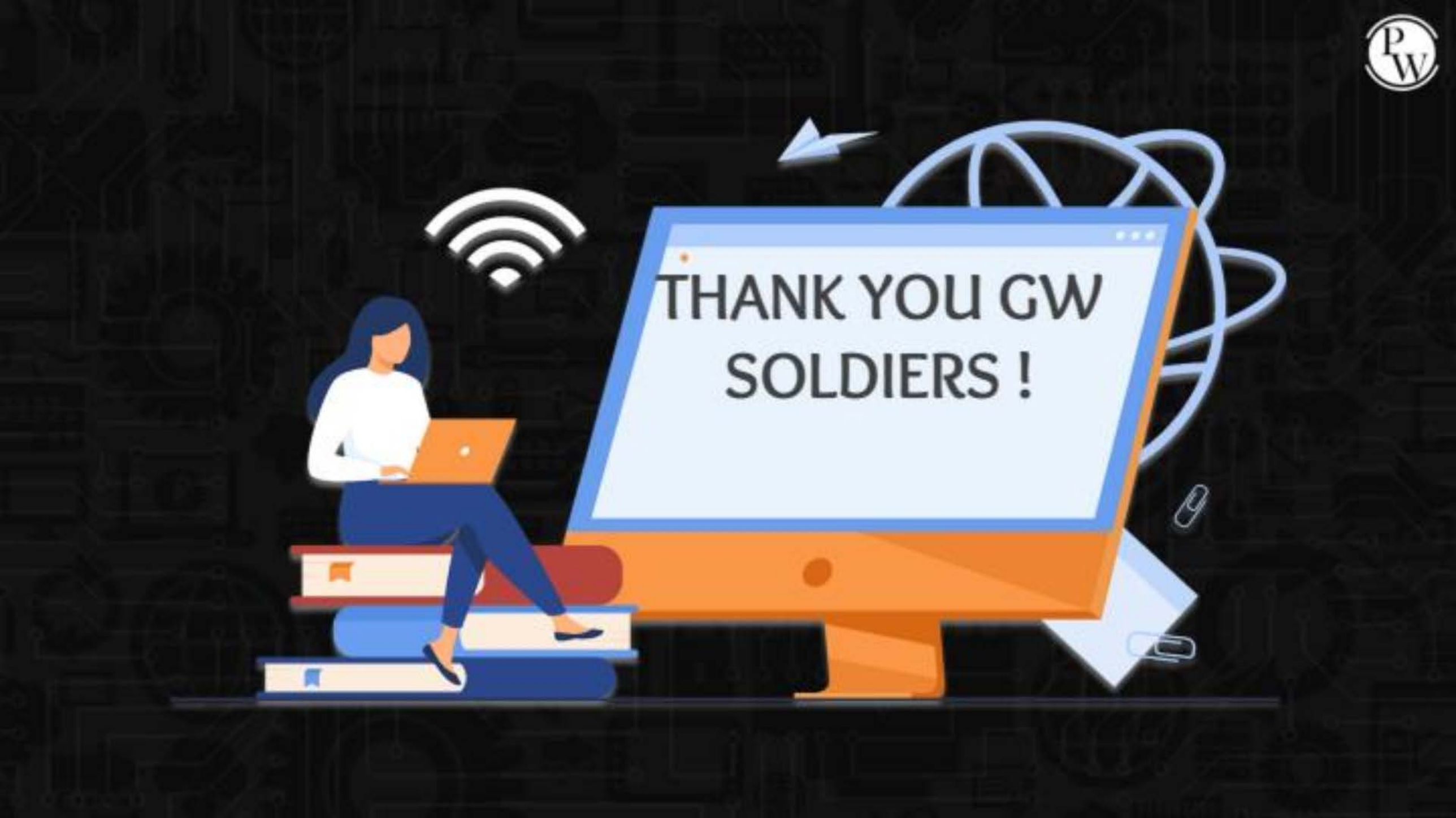
Which of the following evaluate to True?

A. L_1 only

B. L_2 only

C. Both L_1 and L_2 are True ✓

D. Neither L_1 nor L_2


THANK YOU GW
SOLDIERS !