CS & IT ENGINEERING

Discrete Mathematics

Mathematical logic

DPP 07 Discussion notes

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TOPICS TO BE COVERED

01 Question

02 Discussion

Q.1

Consider

[MCQ]

Actor (x) = x is an actor

Smart (x) = x is smart

and the well-formed formula:

$\exists x\,(\text{Actor}(x) \land \text{Smart}(x))$

Choose the correct representation of above in English sentence.

A. Some Actor is smart. (True)

B. Some Actor is not smart. X

C. All actors are smart.

D. All smart are actors.

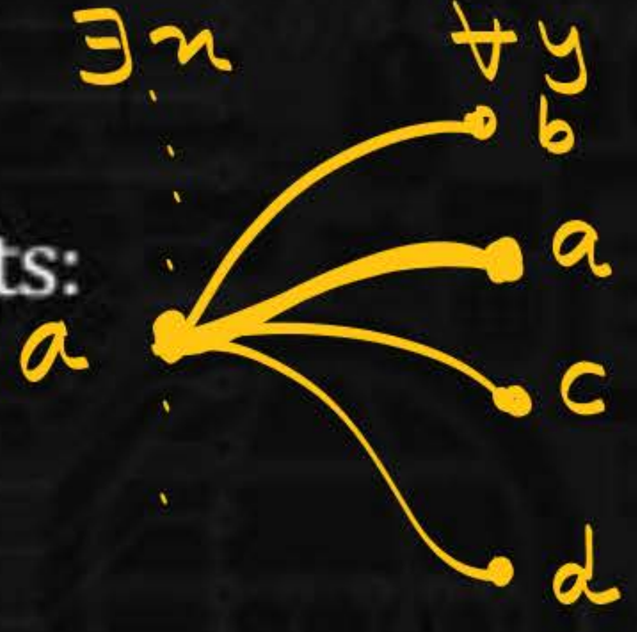
Q.2 Consider the following statement [MCQ]

"There is exactly one apple".

Let G(x) : x is an apple.

$\exists x \forall y \, (\cdots \; x = y)$

Now consider the predicate logic statements:



$x = y$

I. $\exists x \text{ apple }(x) \wedge \forall_y (\text{apple }(y)) \Rightarrow x = y)$

II. $\exists x \text{ apple }(x)$ (false)

The correct representation in predicate logic is ?

A. Only I (True)

B. Only II

C. Both I and II

D. Neither I and II

Q.3

Choose the correct representation for the below statement: [MCQ]

$P(w, f)$: w has taken f

$Q(f, a)$: f is a flight on a

Domain of "w" is all women, the domain of "f" is all flights and the domain of "a" is all airlines.

S: "There is a woman who has taken a flight on every airline in the world"

A. $\exists w\ \forall a\ \exists f\ (P(w, f) \wedge Q(f, a))$ ✓

B. $\exists w\ \forall a\ \exists f\ (P(w, f) \vee Q(f, a))$ ✗

C. ✗ $\forall w\ \forall a\ \exists f\ (P(w, f) \wedge Q(f, a))$

D. None of these

Q.4 Choose among the following that are not equivalent to the given first order logic statement: [MSQ]

$(\exists x)\,(\forall y)\,[p(x,y) \wedge q(x,y)] \wedge \neg r(x,y)$

$\exists x\, \forall y\, \neg(\neg(p \wedge q) \vee R)$

$(p \wedge q) \wedge \neg R$

A. $(\forall x)\,(\exists y)\,[p(x,y) \wedge q(x,y)] \rightarrow r(x,y)$ ×

B. $(\exists x)\,(\forall y)\,[p(x,y) \vee q(x,y)] \wedge \neg r(x,y)$ ×

C. $\neg(\forall x)\,(\exists y)\,[p(x,y) \vee q(x,y)] \rightarrow r(x,y)$ ×

D. $\neg(\forall x)\,(\exists y)\,[p(x,y) \wedge q(x,y)] \rightarrow r(x,y)$ (True)

Q.5

Choose the correct representation for the below statement:

[MCQ]

Player(x): x is a player

Coach(y): y is a coach

Likes (y, x): y likes x

"Every player is liked by some coach"

$\forall x \rightarrow$

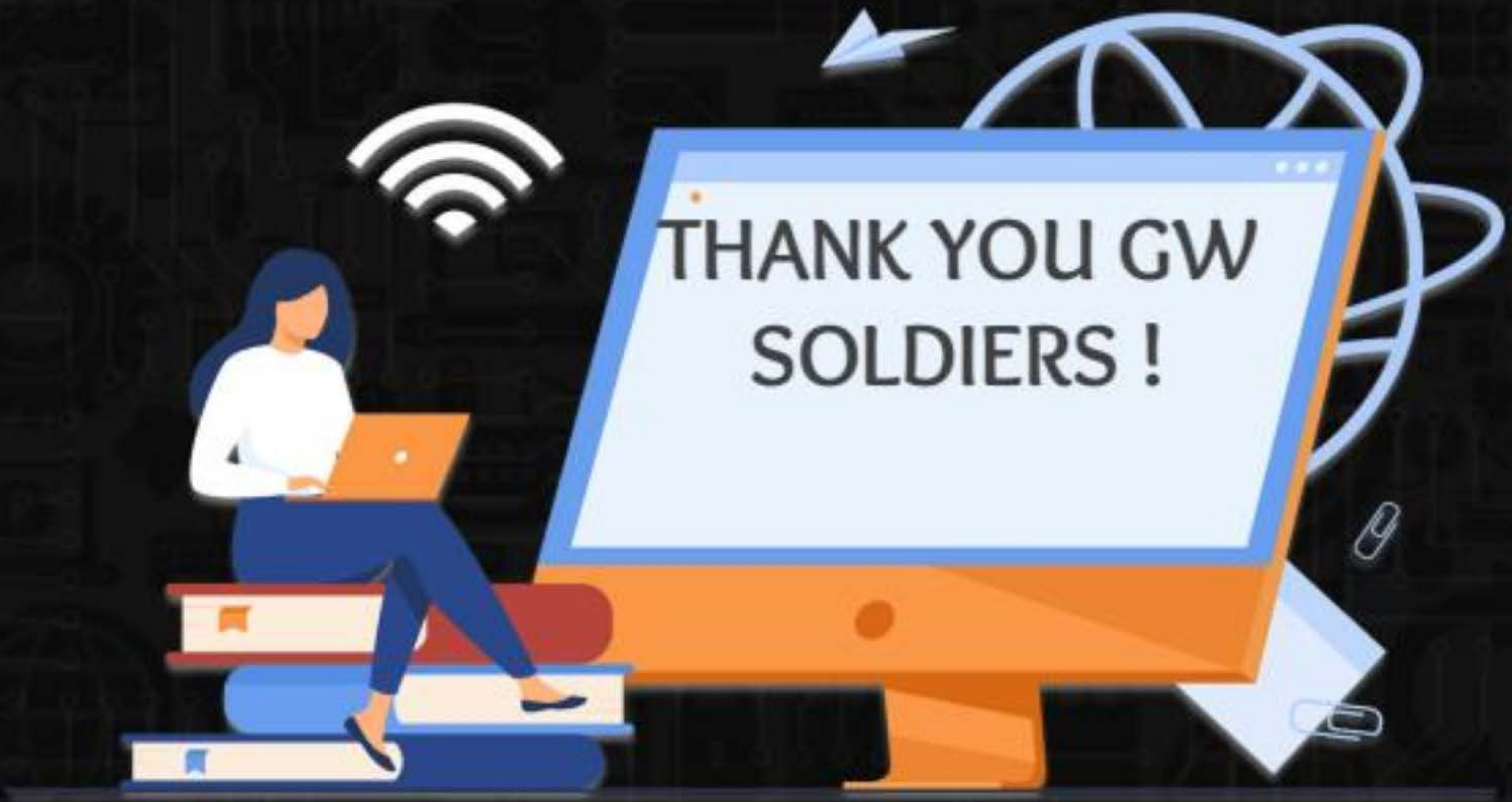
$\exists y \wedge$

A. $\forall(x)\ [\text{player}(x) \rightarrow \exists y\ [\text{coach}(y) \wedge \text{likes}(y, x)]]$ (True)

B. $\forall(x)\ [\text{player}(x) \rightarrow \exists y\ [\text{coach}(y) \rightarrow \text{likes}(y, x)]]$

C. ✗ $\exists(x)\ [\text{player}(x) \rightarrow \forall y\ [\text{coach}(y) \rightarrow \text{likes}(y, x)]]$

D. ✗ $\exists(x)\ [\text{player}(x) \rightarrow \forall y\ [\text{coach}(y) \wedge \text{likes}(y, x)]]$


THANK YOU GW
SOLDIERS !