Discrete Previous Solve

Autumn- 22:-

Q1) a) A set is an unordered collection of objects.

Cardinality of a set:-

The cardinality of a set is the Total number of unique elements in a set. Example:

$A = \{1,2,3,4,5,6\}$ → The cardinality of the set A is equal to 6 because set A has six elements.

Complement of a set:-

The complement of a set A is a set of all those elements of the universal set which do not belong to A and is denoted by A^c or A' or $\bar{A}$.

Example:- Let, $A = \{1,2\}$

$$U = \{1,2,3,4,5\}$$

$$A^c / A' / \bar{A} = U - A$$
$$= \{1,2,3,4,5\} - \{1,2\}$$
$$= \{3,4,5\}$$

Or

(a) centesion product:-

Let A and B be sets. centesion product of A and B denoted by $A \times B$ is defined as-

$$A \times B = \{ (a,b) ; a \in A \text{ and } b \in B \}$$

$(A \times B) \times (C \times D)$ and $A \times (B \times C) \times D$ are not same

Ans pai nai

(b) prove that, $(A \cup B)' = A' \cap B'$

L $\Rightarrow$ ~~$A \cup$~~ $A' \cap B'$

$\Rightarrow \{ x \mid x \notin (A \cap B) \}$

$\Rightarrow \{ x \mid \neg (x \in (A \cap B) \}$

$\Rightarrow \{ x \mid \neg (x \in A \wedge x \in B) \}$

$\Rightarrow \{ x \mid \neg (x \in A) \vee (x \in B) \}$

$\Rightarrow \{ x \mid x \notin A \vee x \notin B \}$

$\Rightarrow \{ x \mid x \in A' \vee x \in B' \}$

$\Rightarrow \{ x \mid x \in A' \cup B' \}$

$\Rightarrow \{ x \mid x \in (A \cup B)' \}$ [proved]

OR

(b) Proper subset:-

Any subset A is said to be proper subset of B, if there is at least one element of B which does not belong to A, if $A \subseteq B$ but $A \neq B$. It is written as, $A \subset B$.

if, $A-B = \{1,5,7,8,15\}$

$B-A = \{3,6,10\}$

$A \cap B = \{2,9,11,15\}$

set $A = \{1, \cancel{5}, 2, 5, 7, 8, 9, 11, 15\}$

set $B = \{3, 6, 10, 2, 9, 11\} = \{2, 3, 6, 9, 10, 11\}$

(c) given, $U = \{1,2,3,4,5,6,7,8,9,10\}$

a) $\{3,4,5\}$

Bit string = 0011100000

(b) $\{1,3,6,10\}$

Bit string = 1010010001

(c) $\{2,3,4,7,8,9\}$

Bit string = 0111001110

(d) given, $U = \{1,2,3,4,5,6,7,8,9,10\}$

~~a) { 3,4,5 }~~

(a) 1111001111

$set = \{1,2,3,4,7,8,9,10\}$

(b) 0101111000

$set = \{2,4,5,6,7\}$

(c) 1000000001

$set = \{1,10\}$

statement

$\boxed{2(b)}$: Given:

$I(x)$ = x has an internet connection

$C(x,y)$ = x and y have chatted over the internet.

U = All student of the class.

i) $\neg C(x,y)$

ii) $\neg \forall x (I(x))$

iii) $\forall x (I(x) \rightarrow \exists x C(x,y))$

Autumn-22-2(c)

(i) $\exists x \forall y (xy = y)$

= There is a real number y for every real number x, such that $xy = y$.

(ii) $\forall x \forall y (x \geq 0) \wedge (y < 0) \rightarrow (x - y > 0)$

= For every real number x and for every real number y if $x \geq 0$ and $y < 0$, then $x - y > 0$.

This statement says that, for real number x and y; if x is positive and y is negative ~~then $(x-y)$ is positive~~ then the difference between x and y is positive.

Autum-22 - 2(d)

(1)

p	q	$\neg p$	$p \vee q$	$\neg p \wedge (p \vee q)$	$\neg p \wedge (p \vee q) \to q$
T	T	F	T	F	T
T	F	F	T	F	T
F	T	T	T	T	T
F	F	T	F	F	T

is a toutology.

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p	q	r	$p \to q$	$p \to r$		$(p \to q) \wedge (p \to r)$	$(p \to q) \wedge (p \to r) \to (p \to r)$
T	T	T	T	T		T	T
T	T	F	T	F		F	T
T	F	T	F	T		F	T
T	F	F	F	F		F	T
F	T	T	T	T		T	T
F	T	F	T	T		T	T
F	F	T	T	T		T	T
F	F	F	T	T		T	T

is a tautology –

4(d)

(1) p: I bought a lottary ticket this week

q: I won the million dollar jackpot

(a) $\neg p$

(b) $p \vee q$

Ans: I bought a lottary ticket this week or I won the million dollar jackpot.

(c) $p \to q$

Ans: If I bought a lottary ticket this week then I won the million dollar jackpot.

(d) $p \wedge q$

Ans: I bought a lottary ticket this week and I won the million dollar jackpot.

(e) $p \leftrightarrow q$

(f) $\neg p \to \neg q$

Ans: If I did not buy a lottary ticket this week then ~~th~~ i will not win the million dollar jackpot.

(h) $\neg p \vee (p \wedge q)$

I did not buy a lottery ticket this week or I bought a ticket this week ~~or~~ and

4(d) OTI

$$f(x) = 2x^2 + 3$$
$$g(x) = 3x + 5$$

$$f \circ g = f(g(x) = f(3x+5)$$
$$= 2.(3x+5)^2 + 3$$
$$= 2.(9x^2 + 25) + 3$$
$$= 18x^2 + 50 + 3$$
$$= 18x^2 + 53$$

$$g \circ f = g(f(x) = g(2x^2+3)$$
$$= 3.(2x^2 + 3) + 5$$
$$= 6x^2 + 9 + 5$$
$$= 6x^2 + 14$$