Thurs_02_10

Thursday, February 10, 2022 2:40 PM

Reminders

1. 1.3, 2.4 due 02/11 11:59 pm
2. Exam #1 is on 02/15
3. No more
   4 in-class exams + 1 Final ⇒ 3 in-class exams + 1 Final
4. Mid semester write up

Exercises from last time

	B	R	O	Total
C	12	29	54	95
W	4	5	6	15
E	374	71	285	730
	390	105	345	840

This table represent the number of elements in each of those sets

for example

$n(C \cap B) = 12$

1. $n(W \cap O) = 6$

	B	R	O	
C	12	29	54	95
W	4	5	6	15
E	374	71	285	730
	390	105	345	840

De morgan's law

$R' \cup W' = (R \cap W)'$

$n(R' \cup W') = n(R \cap W)'$

2. $n(R' \cup W') = n(R \cap W)'$

$= \mathcal{U} - n(R \cap W)$

$= 840 - 5 = 835$

	B	R	O	
C	12	29	54	95
W	4	5	6	15
$\bar{E}$	374	71	285	730
	390	105	345	840

3. $n((C \cup W) \cap (B \cup R)) = 12 + 29 + 4 + 5 = 50$

	B	R	O	
C	12	29	54	95
W	4	5	6	15
$\bar{E}$	374	71	285	730
	390	105	345	840

4. $n((C \cap B) \cup (\bar{E} \cap O)) = n(C \cap B) + n(\bar{E} \cap O) - n((C \cap B) \cap (\bar{E} \cap O))$

$= 12 + 285$

$= 297$

	B	R	O	
C	12	29	54	95
~~W~~	~~4~~	~~5~~	~~6~~	~~15~~
=	374	71	285	730

W	4	7	6	15
E	374	71	285	730
	390	105	345	840

5. $n(B \cap (W \cup R)') = 12 + 374 = 386$

Chapter 3 Introduction to Logic

3.1 Statements and Quantifiers

Statement – A sentence that must be either true or False cannot be both simultaneously

Example

1. Today is Thursday (True)
2. The Sky is blue
3. Chapl and Chap 2's test is on next tuesday

'No paradoxes'

Compound Statement

formed by combining two or more statements using connectives

examples are and, or, not, if ... then

Examples of Compound Statement

1. If is raining outside then I will take a nap

If is raining outside | I will take a nap

2. I will go back to my dorm or I will hang out with my friends

Negation

The negation of a true statement is false and the negation of a false statement is true

Forming Negations

1. Tommorrow is Friday (Tommorrow is not Friday)

Negating Inequalities

$a < b$	a less than b
$a > b$	a greater than b
$a \leq b$	a less or equal to b
$a \geq b$	a greater or equal to b

Example

find the negation of the following inequalities

① $x > 20$ ($x \leq 20$)

② $x < -5$ ($x \geq -5$)

③ $x \geq 2$ ($x < 2$)

③ $x \geq 2$ ($x < 2$)

Connective	Symbol in Set theory	Symbol in logic	Type of statement
and	$\cap$	$\wedge$	Conjunction
or	$\cup$	$\vee$	Disjunction
Not	$'$	$\sim$	Negation

let p, q be statements

$\sim p$ negation of p

$\sim q$ negation of q

translating symbols to words

let p, q be statements

p = she has green eyes

q = He is 60 years old

① $\sim p$ she does not have green eyes

② $\sim q$

③ $p \wedge q$

④ $p \vee q$

(5) $\sim p \vee q$

(6) $p \wedge \sim q$

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

(8) $\sim(\sim p \wedge q)$ It is not the case that she does not have green eyes and he is 60 years old

⇓

She has green eys and he is not 60 years old

Quantifiers

Universal quantifiers — all, each, every, None

Existential quantifiers — Some, there exist, at least

Find the negation of the following

1. No cats have fleas

(Some cats have fleas)

Statement	Negation
All do	Some do not
Some do	None do

(Write a statement with a universal quantifier)

(If a statement has a universal quantifier
its negation have an existential quantifier)

(If a statement has an existential quantifier
its negation have a universal quantifier)