

Notes 2-3 Logic

Disjunction

Disjunction: a compound sentence formed by combining two simple sentences using the word "or".

Symbol: \vee

ex 1) p: Pat eats pizza.

q: Carol drinks Coke.

$p \vee q$: Pat eat Pizza or Carol drinks Coke.

ex 2) Use the following statements:

Let k represent "Kurt plays baseball."

Let a represent "Alicia plays baseball."

Let n represent "Nathan plays soccer."

Write each given sentence in symbolic form.

a) Kurt or Alicia play baseball. $k \vee a$

b) Kurt plays baseball or Nathan plays soccer. $k \vee n$

c) Alicia plays baseball or Alicia does not play baseball. $a \vee \sim a$

d) It is not true that Kurt or Alicia does play baseball. $\sim (k \vee a)$

e) Either Kurt does not play baseball or Alicia does not play baseball.

f) It's not the case that Alicia or Kurt play baseball.

$\sim (a \vee k)$

$\sim k \vee \sim a$

Truth Table for Disjunction:

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

In logic,
OR \rightarrow And/OR
(Inclusive meaning)

* 'Or' is true as long as at least 1 part is True.

k: "Every line segment has a midpoint." True

m: "A line has a midpoint." False

q: "A ray has one endpoint." True

A. Write a complete sentence in words to show what the symbols represent.

B. Tell whether the statement is true or false.

1) $k \vee q$ Every line segment has a midpoint or a ray has one endpoint. $T \text{ or } T = \textcircled{T}$

2) $k \vee m$ Every line segment has a midpoint or every line has a midpoint. $T \text{ or } F = \textcircled{T}$

3) $m \vee \sim q$ A line has a midpoint or a ray does not have an endpoint. $F \text{ or } F = \textcircled{F}$

4) $\sim(m \vee q)$ It is not the case that a line has a midpoint or a ray has one endpoint.
 $\sim(F \text{ or } T)$
 $\sim(T) = F$

ex 4) Find the solution set of each of the following if the domain is the set of positive integers less than 8. $\{1, 2, 3, 4, 5, 6, 7\}$

a) $(x < 4) \vee (x > 3)$

$1, 2, 3$ $4, 5, 6, 7,$

$\{1, 2, 3, 4, 5, 6, 7\}$

b) $(x > 3) \vee (x \text{ is odd})$

$4, 5, 6, 7$ $1, 3, 5, 7$

$\{1, 3, 4, 5, 6, 7\}$

c) $(x > 5) \wedge (x < 3)$

$6, 7$ $1, 2$

↑
And

\emptyset or $\{\}$