

2.2 Logic

Truth Tables A convenient method for organizing the truth values of statements is to use a truth table.

Negation	
p	$\sim p$
T	F
F	T

If p is a true statement, then $\sim p$ is a false statement.

If p is a false statement, then $\sim p$ is a true statement.

Truth tables can also be used to determine truth values of compound statements.

Conjunction		
p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

A conjunction is true only when both statements are true.

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

A disjunction is false only when both statements are false.

Ex1 Use the following statements to write a compound statement. Then find its truth value.

p : One foot is 14 inches

q : September has 30 days

r : A plane is defined by 3 noncollinear points.

a). Write $\sim p \wedge q$.
 \nwarrow and \nearrow
 One foot is not 14 inches and Sept. has 30 days
 TRUE

b). Write $p \vee \sim r$.
 \nwarrow OR \nearrow
 One foot is 14 inches OR a plane is not defined by 3 noncollinear points
 FALSE

2.2 Truth Tables

Truth Table-

To construct:

- 1). Put a column for each variable you have
- 2). Put a column in for each negation
- 3). Put a column in for each conjunction/disjunction () first if the problem has them.
- 4). Fill in each column with T,F appropriately.

Ex2 Construct the truth table for $\sim q \wedge r$.

and $(q \wedge r)$

q	r	$\sim q$	$q \wedge r$	$\sim q \wedge r$
T	T	F	T	F
T	F	F	F	F
F	T	T	F	T
F	F	T	F	F

Ex3 Construct the truth table for $p \wedge (q \vee r)$.

do 1st

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

Prior knowledge
Booklet

Hw: PG 89 #13-24, 32-41 all

Review: pg 115 #8-17 all