

Mat 300 Assignment 1 Answers**CUP (downward wedge) = OR and CAP (upward wedge) = AND****#1 Section 25 #4, Truth Tables**(a) Truth Table for $A \cup \sim B$

A	B	$\sim B$	$A \cup \sim B$
T	T	F	T
T	F	T	T
F	T	F	F
F	F	T	T

(b) Truth Table for $\sim A \rightarrow B$

A	B	$\sim A$	$\sim A \rightarrow B$
T	T	F	T
T	F	F	T
F	T	T	T
F	F	T	F

(c) Truth Table for $\sim A \rightarrow \sim B$

A	B	$\sim A$	$\sim B$	$\sim A \rightarrow \sim B$
T	T	F	F	T
T	F	F	T	T
F	T	T	F	F
F	F	T	T	T

(d) Truth Table for $A \rightarrow (A \cup \sim B)$

A	B	$\sim B$	$A \cup \sim B$	$A \rightarrow (A \cup \sim B)$
T	T	F	T	T
T	F	T	T	T
F	T	F	F	T
F	F	T	T	T

(e) Truth Table for $\sim(A \rightarrow B)$

A	B	$A \rightarrow B$	$\sim(A \rightarrow B)$
T	T	T	F
T	F	F	T
F	T	T	F
F	F	T	F

#2 Section 25 #6, Truth Tables

(a) Truth Table for $A \cap (B \cap C)$

A	B	C	$B \cap C$	$A \cap (B \cap C)$
T	T	T	T	T
T	T	F	F	F
T	F	T	F	F
T	F	F	F	F
F	T	T	T	F
F	T	F	F	F
F	F	T	F	F
F	F	F	F	F

(b) Truth Table for $A \cup (B \cap C)$

A	B	C	$B \cap C$	$A \cup (B \cap C)$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	T
F	T	T	T	T
F	T	F	T	T
F	F	T	T	T
F	F	F	F	F

(c) Truth Table for $A \rightarrow (B \cap C)$

A	B	C	$B \cap C$	$A \rightarrow (B \cap C)$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F
F	T	T	T	T
F	T	F	T	T
F	F	T	T	T
F	F	F	F	T

(d) Truth Table for $(A \rightarrow \sim B) \cap C$

A	B	C	$\sim B$	$A \rightarrow \sim B$	$(A \rightarrow \sim B) \cap C$
T	T	T	F	F	F
T	T	F	F	F	F
T	F	T	T	T	T
T	F	F	T	T	F
F	T	T	F	T	T
F	T	F	F	T	F
F	F	T	T	T	T
F	F	F	T	T	F

#3 Truth Table for $A \rightarrow B$

A	B	$A \rightarrow B$
T	T	T
T	F	F
F	T	T
F	F	T

#4 Truth Table for $\sim B \rightarrow \sim A$

A	B	$\sim A$	$\sim B$	$\sim B \rightarrow \sim A$
T	T	F	F	T
T	F	F	T	F
F	T	T	F	T
F	F	T	T	T

NOTICE THAT THESE TABLES ARE THE SAME. So the statements are equivalent.

The statement $\sim B \rightarrow \sim A$ is the ***CONTRAPOSITIVE*** of $A \rightarrow B$.