Midterm Study Guide

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1 Arguments

For each of the following, put the argument in propositional form, then draw a truth table to prove whether it is valid or invalid.

Here's a sample truth table for you to work with:

A	B	
T	T	
T	F	
F	T	
F	F	

And a 3 column one:

A	B	C	
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

1.(a) Not both A and B.

$\therefore$ Not A or not B.

Solution: This is one of DeMorgan's laws.
VALID

A	B	Not (A and B)	Not A or Not B
T	T	F	F
T	F	T	T
F	T	T	T
F	F	T	T

2. You can go to graduate school only if you graduate from college. Therefore, if you didn't graduate from college, you didn't go to graduate school.

Solution:

(a) If A, then B. (If grad school, then graduated)

$\therefore$ If not B, then not A. (If did not graduate, then not grad school)

Conversion
VALID

A	B	If A, then B	If not B, then not A
T	T	T	T
T	F	F	F
F	T	T	T
F	F	T	T

3.(a) The clock is not correct.

$\therefore$ It is not the case that it is not the case that the clock is not correct.

Solution: This is double negation.
VALID

A	B	A	Not not A
T	T	T	T
T	F	T	T
F	T	F	F
F	F	F	F

4.(a) If we didn't eat out and go to the show, then we can go to the show or get ice cream.

$\therefore$ If we didn't go to the show or get ice cream, then we cannot eat out and go to the show.

Solution: This argument is valid. But it looks like it shouldn't be!

(a) If not (A and B), then B or C.

$\therefore$ If not (B or C), then not (A and B)

A	B	C	Premise 1	Conclusion
T	T	T	T	T
T	F	T	T	T
F	T	T	T	T
F	F	T	T	T
T	T	F	T	T
T	F	F	F	T
F	T	F	T	T
F	F	F	F	T

2 Label the antecedent and consequent

1. If it is cold, I will not be in class.

> **Solution**: Antecedent: It is cold.
> Consequent: I will not be in class.

2. I'll vote for him only if he promises to lower taxes.

> **Solution**: Antecedent: I'll vote for him.
> Consequent: He promises to lower taxes.

3. Only if you are 48 inches tall can you ride the ride.

Solution: Antecedent: You can ride the ride.

Consequent: You are 48 inches tall.

3 Fill in the truth table

1.

A	B	A if and only if B
T	T	T
T	F	F
F	T	F
F	F	T

2.

A	B	C	If A and B, then not (C or not B BNB)
T	T	T	F
T	F	T	T
F	T	T	T
F	F	T	T
T	T	F	T
T	F	F	T
F	T	F	T
F	F	F	T

Note that $\leftrightarrow$ is 'if and only if'.

3.

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