Latex Homework 9th Grade
Unit 1 - Methods of Proof - Formal Style of a Proof
Week 3 - Logic

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1

Form a logical expression using the logical statements A, B, C and the operators $\wedge, \vee, \neg$, which is true if at least two of the statements are true, but false otherwise. Note: not every operator must be used, but you can use no others.

$(A \wedge B) \vee \neg(\neg B \vee \neg C) \vee (A \wedge C)$

A	B	C	$A \wedge B$	$\neg(\neg B \vee \neg C)$	$A \wedge C$	$(A \wedge B) \vee \neg(\neg B \vee \neg C)$	$(A \wedge B) \vee \neg(\neg B \vee \neg C) \vee (A \wedge C)$
T	T	T	T	T	T	T	T
T	T	F	T	F	F	T	T
T	F	F	F	F	F	F	F
F	T	T	F	T	F	T	T
F	F	T	F	F	F	F	F
F	T	F	F	F	F	F	F
T	F	T	F	F	T	F	T
F	F	F	F	F	F	F	F

2

Simplify $\neg(A \wedge \neg(B \wedge \neg(A \wedge \neg B)))$. In particular, your answer should only have negations applied to logical variables and not compound statements.

Step 1: $\neg(A \wedge \neg(B \wedge \neg(A \wedge \neg B)))$

Step 2: $\equiv \neg(A \wedge \neg(B \wedge (\neg A \vee B)))$

Step 3: $\equiv \neg(A \wedge (\neg B \vee (A \wedge \neg B)))$

Step 4: $\equiv A \vee (\neg B \wedge (\neg A \vee B)))$

3

Prove that $A \Rightarrow (B \wedge C)$ is equivalent to $(A \Rightarrow B) \wedge (A \Rightarrow C)$.