

Problem 1. Compute the compound truth table for $\neg p \wedge q$.

p	q	$\neg p$	$\neg p \wedge q$
T	T		
T	F		
F	T		
F	F		

Problem 2. Compute the compound truth table to see if $\neg(p \rightarrow q)$ is the same as $\neg p \rightarrow \neg q$. (In other words, does negation distribute?)

p	q	$p \rightarrow q$	$\neg(p \rightarrow q)$	$\neg p$	$\neg q$	$\neg p \rightarrow \neg q$
T	T					
T	F					
F	T					
F	F					

Problem 3. Compute the compound truth table to see if $(p \wedge q) \rightarrow r$ is the same as $p \rightarrow (q \rightarrow r)$. (Note that here, the equal sign is built into the table!)

p	q	r	$p \wedge q$	$(p \wedge q) \rightarrow r$	$q \rightarrow r$	$p \rightarrow (q \rightarrow r)$	$(p \wedge q) \rightarrow r \equiv p \rightarrow (q \rightarrow r)$
T	T	T					
T	T	F					
T	F	T					
T	F	F					
F	T	T					
F	T	F					
F	F	T					
F	F	F					

Problem 4. Translate the following propositions to logical statements (start with assigning each atomic proposition to a variable).

(a) We are friends if you like Discrete Mathematics or ice cream.

(b) Either we are friends or you like ice cream, but not both.

Problem 5. Define F to be the set of all ice cream flavors known to mankind. For any flavor f in F , define $L(f)$ to be the proposition that I like flavor f .

Translate the following statements to logical notation:

1. I like every flavor of ice cream.
2. I don't like any flavor of ice cream.

Define $L'(f)$ to be the proposition that you like flavor f .

Translate the following statements to logical notation:

1. If you like a flavor of ice cream, I like it too.
2. There isn't a flavor that we both dislike. (Try writing this without $\neg$!)