

logic pset3

Resources: Lecture 3 and Chapters 3 and 5 of *How Logic Works*. (Note that we are skipping over Chapter 4 for now.)

A. Proofs

Use any of the rules of inference, including reductio ad absurdum, to prove the following sequents.

1. $\neg(P \rightarrow Q) \vdash Q \rightarrow R$
2. $P \rightarrow Q \vdash \neg P \vee Q$
3. $P \rightarrow (Q \vee R) \vdash (P \rightarrow Q) \vee R$

B. Truth tables

1. Use truth table reasoning to show that $P \vee (Q \wedge R) \models P \vee Q$. You don't have to display a full truth table, but if you do, explain how the table demonstrates the result.
2. Use truth table reasoning to show that $P \rightarrow (Q \vee R) \not\models P \rightarrow Q$.
3. Use truth table reasoning to show that the following “proof” must have a mistake.

1	(1)	$P \vee Q$	A
2	(2)	P	A
3	(3)	Q	A
2,3	(4)	$P \wedge Q$	2,3 \wedge I
2,3	(5)	P	4 \wedge E
1	(6)	P	1,2,2,3,5 \vee E