

CS 512, Spring 2014

Assignment 1

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Due Monday January 27th

1 Problem 1(a): $P \rightarrow Q, P \rightarrow \neg Q \vdash \neg P$

₁	$P \rightarrow Q$	premise
₂	$P \rightarrow \neg Q$	premise
₃	P	assume
₄	Q	\rightarrow e 1, 3
₅	$\neg Q$	\rightarrow e 2, 3
₆	\perp	\neg e 4, 5
₇	$\neg P$	\neg i

2 Problem 1(b): $P \rightarrow (Q \rightarrow R), P, \neg R \vdash \neg Q$

1	$P \rightarrow (Q \rightarrow R)$	premise
2	P	premise
3	$\neg R$	premise
4	Q	assume
5	$Q \rightarrow R$	$\rightarrow e$ 1, 2
6	R	$\rightarrow e$ 4, 5
7	\perp	$\neg e$ 3, 6
8	$\neg Q$	$\neg i$

3 Problem 2(g): $p \wedge \neg p \vdash \neg(r \rightarrow q) \wedge (r \rightarrow q)$

1	$p \wedge \neg p$	premise
2	p	$\wedge e_1$ 1
3	$\neg p$	$\wedge e_1$ 1
4	\perp	$\neg e$ 2, 3
5	$\neg(r \rightarrow q) \wedge (r \rightarrow q)$	$\perp e$

4 Problem 2(h): $p \rightarrow q, s \rightarrow t \vdash p \vee s \rightarrow q \wedge t$

5 Problem 2(i): $\neg(\neg p \vee q) \vdash p$

1	$\neg(\neg p \vee q)$	premise
2	$\neg p$	assume
3	$\neg p \vee q$	$\vee i$ 2
4	\perp	$\neg e$ 1, 3
5	p	$\neg i$