

CS511 HW1

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1 Exercise 1.1.2 (a)(b)(c)

(a) $((\neg p) \wedge q) \rightarrow r$

(b) $(p \rightarrow q) \wedge \neg((r \vee p) \rightarrow q)$

(c) $(p \rightarrow q) \rightarrow (r \rightarrow (s \vee t))$

2 Exercise 1.2.2. (a): $\neg p \rightarrow \neg q \vdash q \rightarrow p$

1	$\neg p \rightarrow \neg q$	premise
2	q	assumption
3	$\neg\neg q$	$\neg\neg i$ 2
4	$\neg\neg p$	MT 1,3
5	p	$\neg\neg e$ 4
6	$q \rightarrow p$	$\rightarrow i$, 2, 5

3 Exercise 1.2.2. (b): $\neg p \vee \neg q \vdash \neg(p \wedge q)$

1	$\neg p \vee \neg q$	premise
2	$\neg p$	assumption
3	$p \wedge q$	assumption
4	p	$\wedge e_1$ 3
5	\perp	$\perp i$ 2, 4
6	$\neg(p \wedge q)$	$\neg i$ 3-5
7	$\neg q$	assumption
8	$p \wedge q$	assumption
9	q	$\wedge e_2$ 8
10	\perp	$\perp i$ 7, 9
11	$\neg(p \wedge q)$	$\neg i$ 8-10
12	$\neg(p \wedge q)$	$\vee e$, 1, 2-6, 7-11

4 Exercise 1.2.2. (c) $\neg p, p \vee q \vdash q$

1	$\neg p$	premise
2	$p \vee q$	premise
3	q	assumption
4	p	assumption
5	\perp	$\perp i$ 1, 4
6	q	$\perp e$ 5
7	q	$\vee e$ 2, 3, 4-6