

Language & Logic - Assignment III

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1 Question 1

1.1 Brief

$$(P \wedge Q) \rightarrow \neg R : R \rightarrow (P \rightarrow \neg Q)$$

1.2 Answer

1	R	Hypothesis	$\{1\}$
2	P	Hypothesis	$\{1, 2\}$
3	Q	Hypothesis	$\{1, 2, 3\}$
4	$P \wedge Q$	\wedge -Introduction(2, 3)	$\{1, 2, 3\}$
5	$(P \wedge Q) \rightarrow \neg R$	Premise	$\{1, 2, 3, 5\}$
6	$\neg R$	\rightarrow Elimination(4, 5)	$\{1, 2, 3, 5\}$
7	R	Iteration	$\{1, 2, 3\}$
8	$\neg Q$	Reductio Ad Absurdum(3, 6, 7)	$\{1, 2, 5\}$
9	$P \rightarrow \neg Q$	\rightarrow Introduction(2, 8)	$\{1, 5\}$
10	$R \rightarrow (P \rightarrow \neg Q)$	\rightarrow Introduction(1, 9)	$\{5\}$

2 Question 2

2.1 Brief

$$\neg R, P \rightarrow \neg Q, R \rightarrow Q, P \vee R : \neg Q$$

2.2 Answer

1	$P \vee R$	Premise	$\{1\}$
2	P	Hypothesis	$\{2\}$
3	$P \rightarrow \neg Q$	Premise	$\{2, 3\}$
4	$\neg Q$	\rightarrow Elimination(2,3)	$\{2, 3\}$
5	R	Hypothesis	$\{5\}$
6	Q	Hypothesis	$\{5, 6\}$
7	$\neg R$	Premise	$\{5, 6, 7\}$
8	R	Iteration	$\{5, 6\}$
9	$\neg Q$	Reductio Ad Absurdum(6,7,8)	$\{5, 7\}$
10	$\neg Q$	\vee -Elimination(1,2,4,5,9)	$\{1\}$

3 Question 3

3.1 Brief

$$: ((A \vee B) \wedge (\neg B)) \rightarrow A$$

3.2 Answer

1	$((A \vee B) \wedge (\neg B))$	Hypothesis	{1}
2	$A \vee B$	\wedge - Elimination(1)	{1}
3	A	Hypothesis	{1, 3}
4	A	Iteration(3)	{1, 3}
5	B	Hypothesis	{1, 5}
6	$\neg A$	Hypothesis	{1, 5, 6}
7	B	Iteration(5)	{1, 5, 6}
8	$\neg B$	\wedge -Elimination(1)	{1, 5, 6}
9	A	Reductio Ad Absurdum(5,6,7,8)	{1, 5, 6}
10	A	\vee -Elimination(2,3,4,5,9)	{1}
11	$((A \vee B) \wedge (\neg B)) \rightarrow A$	\rightarrow Introduction(1,10)	{}