

# Language & Logic - Assignment III

Tom Goodman

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

### 3 Question 3

#### 3.1 Brief

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