

## Introduction to Logic: Worksheet 2

Due: 28<sup>th</sup> November 2008

1. Which of the following are sentences of *SL* and which are not? For those that are not explain why they are not. For those that are, specify the main connective and the immediate sentential components.

- (a)  $A \& B \& C$
- (b)  $A \equiv ((B \& C) \supset A)$
- (c)  $\mathbf{P} \vee (\mathbf{Q} \supset \mathbf{R})$
- (d)  $\sim [U \supset (A \vee (B \& \sim C))] \equiv T$
- (e)  $(A_1 \supset A_2) \vee (A_3 \supset A_4)$

(5 marks)

2. Determine by means of truth-tables whether the following sentences are truth-functionally true, truth-functionally false, or truth-functionally indeterminate.

- (a)  $A \vee B$
- (b)  $S \supset (\sim S \supset T)$
- (c)  $(A \& B) \equiv (\sim A \vee \sim B)$
- (d)  $[(A \supset B) \& (B \supset C)] \supset (A \supset C)$

(8 marks)

3. In each of the following, explain you answers.

- (a) Suppose that  $\mathbf{P}$  and  $\mathbf{Q}$  are truth-functionally equivalent. From this information alone can we tell whether  $\mathbf{P} \equiv \mathbf{Q}$  is truth-functionally true, truth-functionally false, or truth-functionally indeterminate?
- (b) Suppose that  $\{\sim \mathbf{P}\}$  is truth-functionally consistent. From this information alone can we tell whether  $\mathbf{P}$  is truth-functionally true, truth-functionally false, or truth-functionally indeterminate?
- (c) Suppose that  $\mathbf{P}$  is truth-functionally false. From this information alone can we tell whether any argument which has  $\mathbf{P}$  as a premise is truth-functionally valid?
- (d) Suppose that  $\mathbf{P}$  is truth-functionally indeterminate. Does it follow that the sentence it symbolises is logically indeterminate?
- (e) Suppose that the sentences  $\mathbf{P}$  and  $\mathbf{Q}$  symbolise are logically inconsistent. Does it follow that  $\mathbf{P}$  and  $\mathbf{Q}$  are truth-functionally inconsistent?

(10 marks)

4. Use truth-tables to determine whether the following sets of sentences are consistent.

- (a)  $\{(A \supset B), (C \& A), (C \equiv \sim B)\}$
- (b)  $\{(H \vee I), \sim G, (G \equiv \sim I)\}$

(4 marks)

5. Use truth-tables to determine whether the following arguments are valid.

- (a) 
$$\begin{array}{l} A \supset B \\ \sim A \\ \hline \sim B \end{array}$$
- (b) 
$$\begin{array}{l} \sim B \\ \sim A \equiv B \\ \hline A \end{array}$$

(4 marks)

(Total 31 marks)