

Problem Set 4

Hand in answers to the following questions in class on Thursday, February 1.

[7 marks for each proof, 4 marks for each truth-table row = 50 marks total]

Proofs are best done with your Boolean goggles on, so I suggest first writing #4 and #7 in Boolean form. For the first four questions, **show that the argument is TT con by providing a formal proof.** [Hint: The first two are *really* easy, needing only \wedge Elim, \wedge Intro and \vee Intro. Don't overthink them!]

1.

$$\frac{\begin{array}{l} (A \vee B) \wedge \neg(C \wedge \neg D) \\ \neg C \wedge \neg(A \wedge B) \end{array}}{(A \vee B) \wedge \neg(A \wedge B)}$$

2.

$$\frac{\begin{array}{l} (\neg A \vee C) \wedge B \\ C \end{array}}{(A \vee B) \wedge C}$$

3.

$$\frac{\neg(A \vee B)}{\neg B}$$

4.

$$\frac{\begin{array}{l} \neg \text{Cube}(c) \\ \neg \text{Tet}(c) \end{array}}{\neg(\text{Tet}(c) \vee \text{Cube}(c))}$$

For the remaining questions, first **determine whether or not the argument is TT con.** If it is, then show this with a *formal* proof. If it is not, then provide a counter-example row of its truth table. (For once, don't give a counter-example world.)

5.

$$\frac{(A \wedge B) \vee C}{C \vee B}$$

6.

$$\frac{\begin{array}{l} \neg(A \vee B) \vee C \\ \neg A \end{array}}{\neg C}$$

7.

$$\frac{\begin{array}{l} \text{Cube}(a) \vee \text{Cube}(b) \\ \neg(\text{Cube}(c) \wedge \text{Cube}(b)) \end{array}}{\neg \text{Cube}(c)}$$

8.

$$\frac{A \vee (B \wedge C)}{(A \vee B) \wedge (A \vee C)}$$