

Lassonde Faculty of Engineering  
EECS

MATH1090. Problem Set No. 2

Posted: Oct. 5, 2016

**Due: Oct. 21, 2016, by 3:00pm; in the course  
assignment box.**



It is worth remembering (from the course outline):

The homework must be each individual's own work. While consultations with the instructor, tutor, and among students, are part of the learning process and are encouraged, nevertheless, *at the end of all this consultation* each student will have to produce an individual report rather than a copy (full or partial) of somebody else's report.

“Show that  $\Gamma \vdash A$ ” means write a  $\Gamma$ -proof that establishes  $A$ . The proof can be Equational or Hilbert-style. Equational is rather easier in Boolean Logic.

The concept of “late assignments” does not exist in this course.



A brief but full justification of each proof step is required!

**Do all the following problems; (5 Points Each).**



You may *NOT* use any of the Deduction Theorem, Resolution, Post's Theorem. Any such solutions will be discarded.



1. Show that  $A \rightarrow B \vdash A \vee C \rightarrow B \vee C$
2. Show that  $\vdash (A \rightarrow B) \rightarrow A \vee C \rightarrow B \vee C$
3. Show that  $A \rightarrow (B \rightarrow C) \vdash A \rightarrow C$
4. Show that  $\vdash A \vee (B \rightarrow A) \equiv B \rightarrow A$
5. Show that  $A \vee A \vee A \vdash B \rightarrow A$

6. Suppose you are given for some formulae  $A$  and  $B$  that  $\vdash A$  and  $\vdash B$ . Show that  $\vdash A \equiv B$ .
7. For any formula  $A$ , show that  $\perp \vdash A$ .
8. For any formulae  $A$  and  $B$  show that  $A, \neg A \vdash B$