Lassonde School of Engineering

Dept. of EECS

Professor G. Tourlakis

MATH1090 A. Problem Set No2

Posted: Oct. 8, 2022

Due: Oct. 31, 2022; by 3:00pm, in eClass.

Q: **How do I submit?**

A:

(1) **Submission must be a SINGLE *standalone* file to eClass. Submission by email is not accepted.**

(2) **Accepted File Types: PNG, JPEG, PDF, RTF, MS WORD, OPEN OFFICE, ZIP**

(3) **Deadline is strict, electronically limited.**

(4) **MAXIMUM file size = 10MB**

Post's Theorem use is not allowed *in any question below.*

1. (4 MARKS) Prove **Equationally** that $A, B \vdash A \to B$.

2. (4 MARKS) Prove **Equationally** that

$$\Gamma \vdash A \text{ and } \Gamma \vdash B \text{ implies } \Gamma \vdash A \equiv B$$

 **Caution**. If a proof style is explicitly **required** in what follows, then any other style used gets 0 marks even if it is correct. 

3. (5 MARKS) Prove **Equationally** that for any A,

$$A, \neg A \vdash A \equiv \neg A$$

4. (4 MARKS) Prove **Equationally** that $\vdash X \to Q \to X$.

5. (4 MARKS) Prove **Equationally** that $\neg B \to \neg A \vdash A \to B$.

6. Prove that $A \to B, C \to D \vdash A \vee C \to B \vee D$.

two proofs are required:

- (4 MARKS) One **with** the Deduction theorem (and a **Hilbert**-style proof; CUT rule IS allowed in this subquestion).
- (4 MARKS) One Equational, **WITHOUT** using the Deduction theorem.