York University

Faculties of Pure and Applied Science, Arts, Atkinson

MATH 2090. Problem Set #2. Posted October 8, 2003

Due in the Course Box: October 17, 2003

Section A

In your proofs it is imperative to clearly state what **tools** you use (e.g., WLUS, s WLUS, MP, Auxiliary Variable, Monotonicity, Deduction Theorem, Generalisation, which axiom(s), etc.)

1. When doing problems from GS, please convert GS-assertions to "standard notation" before you start your proof.

   Conventions **AND** notation from class apply!

2. Note that we *only* have the set theory axioms presented in the web documents "Notes on a (very) Elementary Set Theory" Parts I and II.

3. Informal proofs are allowed unless otherwise stated. Like formal proofs, they must be **complete** and **correct**.

   Marks will be deducted from very long unreadable proofs even if they are correct. Please think before you start "proving".

Probl. 1. From the text p.213–215: Do the problems

$$11.7(c), 11.12((a),(b),(d)), 11.13(e), 11.15, 11.18$$

For the first and last in the list above, formal proofs are required.

Also do

Probl. 2. Prove **informally** $ST \vdash (\forall a, b, c, d)\big(\{a, \{a, b\}\} = \{c, \{c, d\}\} \Rightarrow a = c \wedge b = d\big)$.

To avoid an embarrassing situation I note that the above is **not** the same problem that I assigned last year. Do you see the difference?

Probl. 3. Give a **formal** proof of $ST \vdash A \subset B \Rightarrow (\exists x)(x \notin A)$.

Probl. 4. Prove without using the axiom of foundation that $1 \neq \{1\}$ and $\emptyset \neq \{\emptyset\}$.