Mathematics 2200H – Mathematical Reasoning TRENT UNIVERSITY, Fall 2024

KENT UNIVERSITY, Fall 202

Assignment #3

A Little Set Theory Due on Friday, 27 September..*

You should probably check out the axioms described in the handout *The Zermelo-Fraenkel* Axioms of Set Theory before tackling this assignment. Note that these axioms are given somewhat informally – manifestly not in the formal language for set theory mentioned in class – so you should give similarly informal arguments in answering the questions below. Should you try to answer these questions using that language and formal deductions, you will probably regret it ...

- **1.** Suppose x is a set. Give an informal proof using the Zermelo-Fraenkel axioms that the successor of x, namely $S(x) = x \cup \{x\}$, is also a set. [5]
- **2.** Suppose u and w are sets. Give an informal proof using the Zermelo-Fraenkel axioms showing that is not possible to have both $u \in w$ and $w \in u$. [5]

Hint: The Axiom of Foundation is the key to **2**.

Another logic limerick:

It's a critical logical creed: Always check that it's safe to proceed. To tell us deductions Are truthful productions, It's the Soundness of logic we need.

^{*} Please submit your solutions, preferably as a single pdf, via Blackboard's Assignments module. If that fails, please submit them to the instructor on paper or via email to sbilaniuk@trentu.ca as soon as you can,