# Proof Theory, 2021

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## Exercises, Set 1

**Exercise 0.1.** *The formulation of* G3cp *uses multi-sets. If we take exactly the same system but now we interpret the* $\Gamma$ *and* $\Delta$*'s as* sets *instead of multi-sets we obtain an incomplete proof system. Provide a tautology that is not provable in the system and reason to the effect that indeed the tautology is not provable.*

**Exercise 0.2.**

1. *Prove the tautology* $p \vee \neg p$ *in Natural Deduction.*
2. *Prove the tautology* $p \vee \neg p$ *in* G3cp*.*

**Exercise 0.3.** *Analyse possible proofs in* G3ip *to show that Peirce's formula* $((p \to q) \to p) \to p$ *is not provable in* G3ip*. Thus, in this exercise it is explicitly disallowed to use Kripke semantics or something similar to conclude the non derivability.*