Earlier Exam

- Exercise 2 of the exam of March 4, 2016.

Intuitionistic Logic

- $\Vdash \varphi \supset \neg\neg\varphi$?
- $\Vdash \neg\neg\varphi \supset \varphi$?
- $\Vdash (\varphi \supset \neg\psi) \supset (\neg\neg\varphi \supset \neg\psi)$?
- Prove that φ is a propositional tautology if and only if $\Vdash \neg\neg\varphi$.

Fitting

- Argue that the Example on slide 32 illustrating the abstraction algorithm gives, via the Curry–Howard correspondence, a solution to Exercise 4.1.1. That is, first show that $x : P \supset (Q \supset R), y : Q, z : P \vdash (xz)y : R$ can be inferred in the type inference system (we identify $\supset$ with $\rightarrow$). Next, show that performing the abstraction algorithm three times to compute $[x][y][z](xz)y$ yields a (closed) term of type $(P \supset (Q \supset R)) \supset (Q \supset (P \subset R))$. Conclude this gives rise to a Hilbert System proof of $(P \supset (Q \supset R)) \supset (Q \supset (P \subset R))$.
- In the solution to Exercise 4.1.1 I had made use of the following extra rule (having priority over the others) for the abstraction algorithm:

  $$[x](Mx) \quad = \quad M \qquad \text{if } x \notin \mathsf{FV}(M)$$

  Show this optimisation to be correct (in the sense of the lemmata on slide 33), and check whether or not I made a mistake in my solution,. Is the extra rule to be preferred or not? Argue why (not).
- Bonus Implement both above versions of the abstraction algorithm and check whether or not slide 32 and the earlier solution to Exercise 4.1.1 are correct.
- Bonus Exercise 4.1.8 (again . . .)