

PROBLEM SET 2

LARS BIRKEDAL AND DANIEL GRATZER

As before, submit the solution to Daniel via email by March 04, 2024.

Exercise 2.2. *Show that substitutions $\Gamma \vdash \gamma : \Gamma.A$ satisfying $\mathbf{p} \circ \gamma = \mathbf{id}$ are in bijection with terms $\Gamma \vdash a : A$.*

Exercise 2.4. *Given $\Delta \vdash \gamma : \Gamma$ and $\Gamma \vdash A$ type, construct a substitution that we will name $\gamma.A$, satisfying $\Delta.A[\gamma] \vdash \gamma.A : \Gamma.A$.*

Exercise 2.5. *Suppose that $\Gamma \vdash A$ type and $\vdash \Delta \text{ cx}$. Show that substitutions $\Delta \vdash \gamma : \Gamma.A$ are in bijection with pairs of a substitution $\Delta \vdash \gamma_0 : \Gamma$ and a term $\Delta \vdash a : A[\gamma_0]$.*

The following is a bonus exercise; we encourage you to attempt it, but it is not mandatory to complete. For those categorically inclined, we encourage you to see if you can relate this property to a more familiar categorical statement.

Exercise 2.3. *Show that the following equation $(\gamma.a) \circ \delta = (\gamma \circ \delta).a[\delta]$.*