

Interactive Theorem Proving	SS 2013	703641
Week 7		May 16, 2013

Homework

1. Define in HOL Light the type of lambda terms
   (a) Define the inductive type that represents the lambda terms
   (b) Define the free variables of a lambda term (lam $\to$ set)
   (c) Define α-equivalence relation on lambda terms
   (d) (medium) Define the quotient type of the terms by this relation
   (e) (medium) Lift the basic functions that operate on the terms
   (f) (medium) Prove the properties of the lifted functions
   (g) (hard) Define the substitution on the quotient type
2. Find λ_2 terms of the following types or give a model that would say why this is not possible:
   - $\forall a.(a \to \forall b.(b \to (a \wedge b)))$
   - $\forall b.(\forall a.((a \to b) \wedge (b \to a)))$
   - (hard) $\exists a.\exists b.((a \vee b) \wedge (\neg a \vee \neg b))$