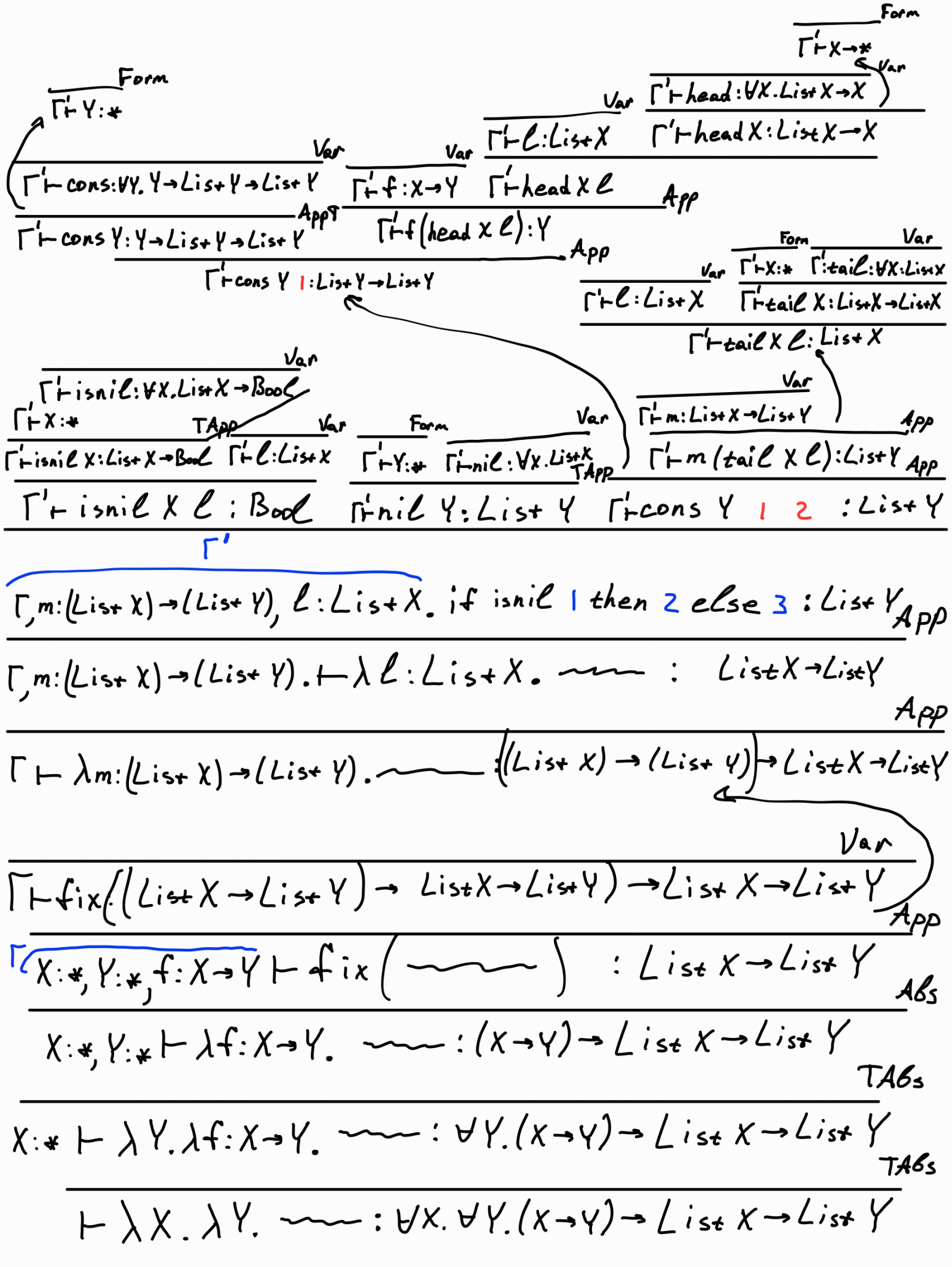
1).


Form
Γ' ⊢ X : *
Var
Γ' ⊢ head : ∀X. List X → X
Γ' ⊢ head X : List X → X
Form
Γ' ⊢ Y : *
Var
Γ' ⊢ cons : ∀Y. Y → List Y → List Y
Var
Γ' ⊢ f : X → Y
Var
Γ' ⊢ l : List X
Γ' ⊢ head X l
App
Γ' ⊢ f (head X l) : Y
AppT
Γ' ⊢ cons Y : Y → List Y → List Y
App
Γ' ⊢ cons Y 1 : List Y → List Y
Form
Γ' ⊢ X : *
Var
Γ' : tail : ∀X : List X
Var
Γ' ⊢ l : List X
Γ' ⊢ tail X : List X → List X
Γ' ⊢ tail X l : List X
Var
Γ' ⊢ m : List X → List Y
App
Γ' ⊢ m (tail X l) : List Y
Var
Γ' ⊢ isnil : ∀X. List X → Bool
Γ' ⊢ X : *
TApp
Var
Γ' ⊢ isnil X : List X → Bool
Γ' ⊢ l : List X
Γ' ⊢ isnil X l : Bool
Form
Γ' ⊢ Y : *
Var
Γ' ⊢ nil : ∀X. List X
TApp
Γ' ⊢ nil Y : List Y
Γ' ⊢ cons Y 1 2 : List Y
Γ'
Γ, m : (List X) → (List Y), l : List X . if isnil 1 then 2 else 3 : List Y
App
Γ, m : (List X) → (List Y) . ⊢ λ l : List X . ~~~ : List X → List Y
App
Γ ⊢ λ m : (List X) → (List Y) . ~~~ : ((List X) → (List Y)) → List X → List Y
Var
Γ ⊢ fix ((List X → List Y) → List X → List Y) → List X → List Y
App
Γ, X : *, Y : *, f : X → Y ⊢ fix (~~~) : List X → List Y
Abs
X : *, Y : * ⊢ λ f : X → Y . ~~~ : (X → Y) → List X → List Y
TAbs
X : * ⊢ λ Y . λ f : X → Y . ~~~ : ∀ Y . (X → Y) → List X → List Y
TAbs
⊢ λ X . λ Y . ~~~ : ∀ X . ∀ Y . (X → Y) → List X → List Y

2). $pair = \lambda X.\ \lambda f:X.\ \lambda s:X.\ \lambda B:X\to X\to X.\ B\ f\ s$

$fst = \lambda X.\ \lambda p:(X\to X\to X)\to X.\ p\ (\lambda f:X.\ \lambda s:Y.\ f)$

$snd = $ ——— // ——— (with s)

$rev' = \lambda X.\lambda p:(X\to X\to X)\to X.\ pair\ X\ (cons\ X\ (head\ X\ (snd\ X\ p))\ (fst\ X\ p))\ (tail\ X\ (snd\ X\ p))$

$rev'' = \lambda X.\ fix\ (\lambda r:((X\to X\to X)\to X)\to(X\to X\to X)\to X.\ \lambda p:(X\to X\to X)\to X.\ if\ isnil\ X\ (snd\ X\ p)\ then\ p\ else\ r\ (rev'\ X\ p))$

$reverse = \lambda X.\lambda \ell:List\ X.\ fst\ X\ (rev''\ X\ (pair\ X\ (nil\ X)\ \ell))$

3). $pair = \lambda X.\ \lambda Y.\ \lambda f:X.\ \lambda s:Y.\ \lambda R.\ \lambda B:X\to Y\to R.\ B\ f\ s$

$fst = \lambda X.\ \lambda Y.\ \lambda p:\forall R.(X\to Y\to R)\to R.\ p\ X\ (\lambda f:X.\ \lambda s:Y.\ f)$ Y

$snd = $ ——— // ——— (with s)

$Biggest = \lambda X.\ \lambda p:\forall R.(X\to List\ X\to R)\to R.\ \lambda c:X\to X\to Bool.$

$if\ c\ (fst\ X\ (List\ X)\ p)\ (head\ X\ (snd\ X\ (List\ X)\ p))$

$then\ (\lambda p'.\ pair\ X\ (List\ X)\ (fst\ X\ (List\ X)\ p')\ (cons\ X\ (head\ X\ (snd\ X\ (List\ X)\ p))$

$(snd\ X\ (List\ X)\ p'))\ (Biggest\ X\ (pair\ (fst\ X\ (List\ X)\ p)\ (tail\ X\ (snd\ X\ (List\ X)\ p))))$

$else\ (\lambda p'.\ pair\ X\ (fst\ X\ (List\ X)\ p')\ (cons\ X\ (fst\ X\ (List\ X)\ p)\ (snd\ X\ (List\ X)\ p')))$

$(Biggest\ X\ (pair\ X\ (List\ X)\ (head\ X\ (snd\ X\ (List\ X)\ p))\ (tail\ X\ (snd\ X\ (List\ X)\ p))))$

$sort = \lambda X.\ \lambda c:X\to X\to Bool.\ fix\ (\lambda s:List\ X\to List\ X.\ \lambda \ell:List\ X.$

$(\lambda p'.\ (cons\ X\ (fst\ X\ (List\ X)\ p')\ (s\ (snd\ X\ (List\ X)\ p')))$

$(Biggest\ X\ (pair\ X\ (List\ X)\ (head\ X\ \ell)\ (tail\ X\ \ell))\ c))$