8.) Abstract Syntax for lists and their operations

LISTEMPTY ~~of exp.~~

LISTCONS of exp * exp

LISTCAR of exp

LISTCDR of exp

LISTISEMPTY of exp

LIST FORMATION

$$\frac{T \text{ is a type}}{\text{LIST}(T) \text{ is a type}}$$

LIST INTRODUCTION

$$\frac{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash e \;:\; T \text{ is a type}}{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash \text{LISTEMPTY} ~~(e)~~ \;:\; \text{LIST}(T)}$$

$$\frac{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash e_1 : T_1 \qquad \Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash e_2 : T_2 \qquad T_1 = T_2}{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash \text{LISTCONS}(e_1, e_2) \;:\; \text{LIST}(T_2)}$$

LIST ELIMINATION

$$\frac{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash e \;:\; \text{LIST}(T)}{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash \text{LISTCAR}(e) \;:\; T}$$

$$\frac{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash e \;:\; \text{LIST}(T)}{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash \text{LISTCDR}(e) \;:\; \text{LIST}(T)}$$

$$\frac{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash e \;:\; \text{LIST}(T)}{\Gamma_\xi, \Gamma_\phi, \Gamma_\rho \vdash \text{LISTISEMPTY}(e) \;:\; \text{BOOL}}$$