

Homework 11 - Subtyping

* If there is any problem, please contact TA.

Name:----- Student ID:----- Email: -----

Problem 1. (40 points) Remember in hw5, we extend tuples to records. Now we extend subtypes to records. Please give some subtyping rules for record type, then draw a derivation showing that $\{x : Nat, y : Nat, z : Nat\}$ is a subtype of $\{y : Nat\}$.

Problem 2. (60 points) Prove Lemma [Inversion of the subtype relation]:

1. If $S \leq T_1 \rightarrow T_2$, then S has the form $S_1 \rightarrow S_2$, with $T_1 \leq S_1$ and $S_2 \leq T_2$.
2. If $S \leq \{l_i : T_i^{i \in l \dots n}\}$, then S has the form $\{k_j : S_j^{j \in l \dots m}\}$, with at least the labels $\{l_i^{i \in l \dots n}\}$ (i.e., $\{l_i^{i \in l \dots n}\} \subseteq \{k_j^{j \in l \dots m}\}$) and with $S_j \leq T_i$ for each common label $l_i = k_j$.