
CMCS 312: Programming Languages

Homework 3: Type Safety

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Consider the following language.

$$\begin{aligned} pn & ::= 0 \mid \text{succ } pn \\ nn & ::= 0 \mid \text{pred } nn \\ v & ::= \text{true} \mid \text{false} \mid nn \mid pn \\ t & ::= v \mid \\ & \quad \text{isZero } t \mid \text{succ } t \mid \text{pred } t \mid \\ & \quad \text{if } t \text{ then } t \text{ else } t \end{aligned}$$

Give a small-step semantics and a typing relation for this language and prove type safety. You will need to show both progress and preservation. State and prove other required lemmas.