Consider the following language.

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

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.