For each of the following fixed-point equations, what does recursive construction yield? Does it satisfy the fixed-point equation?

(a) \[ P = \{ n : \text{nat} \cdot n + 0 \land P = \text{null} \lor n : P + 1 \} \]

\[
\begin{align*}
P_0 &= \text{null} \\
P_{n+1} &= n \\
\end{align*}
\]

\[ P_{\infty} = \infty \] which does not satisfy the fixed-point equation.

\[
\begin{align*}
\{ x : \text{null} \} \text{ LIM } \{ n : P_n = \text{null} \} \text{ which does not satisfy the fixed-point equation either.}
\end{align*}
\]

Maybe there isn't any solution.

(b) \[ Q = \{ x : \text{xnat} \cdot x = 0 \land Q = \text{null} \lor x : Q + 1 \} \]

\[
\begin{align*}
Q_0 &= \text{null} \\
Q_{n+1} &= n \\
\end{align*}
\]

\[ Q_{\infty} = \infty \] which does satisfy the fixed-point equation.

\[
\begin{align*}
\{ x : \text{null} \} \text{ LIM } \{ n : Q_n = \text{null} \} \text{ which does not satisfy the fixed-point equation.}
\end{align*}
\]