Give an ML definition of the function $\texttt{map3}$ which has the property that

$$\texttt{map3 } f \ [x_1, x_2, \ldots, x_n] = [f 0 \ x_1 \ x_2 \ x_3, \ldots, f \ x_{n-1} \ x_n \ 0]$$

and deduce the type of $\texttt{map3}$. The function $\texttt{map3iter}$ is defined as follows:

$$\begin{align*}
\textbf{fun } \texttt{map3iter} \ (0::\_ ) &= 0 \\
| \ \texttt{map3iter } g \ x &= 1 + \texttt{map3iter } g \ (\texttt{map3 } g \ x);
\end{align*}$$

Deduce the type of $\texttt{map3iter}$ and explain in words what the function does. Illustrate your answer by considering the call

$$\texttt{map3iter } g \ [1, 1, 1, 1, 1];$$

in an environment in which $\texttt{g}$ is defined as follows:

$$\begin{align*}
\textbf{fun } g \ 0 \ 1 \ _ &= 2 \\
| g \ 1 \ _ &= 1 \\
| g \ 2 \ _ &= 2 \\
| g \ _ \ 0 &= 0 \\
| g \ _ \ n &= n;
\end{align*}$$