Give the denotational semantics for this program:

\begin{verbatim}
read(n);
fact := 1;
i := 1;
while (i <= n) do
  fact := fact * i;
i := i+1;
end
write(fact)
\end{verbatim}

Assume that the initial input stream contains only one integer, \( z \), and \( z \geq 1 \).

Show the main steps of your work. It is not sufficient to provide the value of the \emph{out} function: you must show at least the recursive rule for the \texttt{while do} loop and the state resulting from applying \( dsem_{\text{PROG}} \) to the whole program.