prg $\Rightarrow$ $header$ $[function\ ]^*$ $footer$

$header$ $\Rightarrow$ **\documentclass** **{** ***num*** ***id*** **,** ***id*** **}** **{** ***id*** **}**
\usepackage **{** ***id*** **}**
\begin **{** **document** **}**

$footer$ $\Rightarrow$ **\end** **{** **document** **}**

$function$ $\Rightarrow$ **\begin** **{** **eqcode** **}** **{** ***id*** **}**
{ *[idx [* **,** *idx]^*]* **}**
{ *[ext_type [* **,** *ext_type]^*]* **}** **{** *ext_type* **}**
instr_list
\end **{** **eqcode** **}**

idx $\Rightarrow$ ***id*** *[upper] [lower]*

$upper$ $\Rightarrow$ **^** **{** *[* ***id*** *[(* **+** *|* **-** *)* ***num*** *]* **}** *]*

$lower$ $\Rightarrow$ **_** **{** *expr [* **,** *expr]^*￼* **}**

$type$ $\Rightarrow$ **\type** **{** *(* **Z** *|* **R** *|* **N** *|* **B** *)* **}**

ext_type $\Rightarrow$ *type [* **^** **{** ***num*** **}**
[**_** **{** ***num*** *[* **,** ***num*** *]^* }* *]]*

$instr\_list$ $\Rightarrow$ *[instr* **\endl** *]^*￼*

$instr$ $\Rightarrow$ *definition*
| *declaration*
| *with_loop*
| *return*

$definition$ $\Rightarrow$ *[idx]+ expr*

$boolop$ $\Rightarrow$ **\land**
| **\lor**
| **\lnot**
| **\oplus**

$binop$ $\Rightarrow$ **+**
| **-**
| **\cdot**
| *divide*
| **\ll**
| **\gg**
| **\mod**

$divide$ $\Rightarrow$ *(* **\frac** *|* **\dfrac** *)* **{** *expr* **}** **{** *expr* **}**

$$
\begin{array}{lll}
\textit{function\_call} & \Rightarrow & \texttt{\textbackslash call} \;\; \{ \;\; \textbf{\textit{id}} \;\; \} \;\; \{ \;\; [\textit{idx} \, [\;\; \textbf{,} \;\; \textit{id} \;\;]^* \,] \;\; \} \\[4pt]
\textit{sexpr} & \Rightarrow & (\;\; \textbf{\textit{idx}} \;\; | \;\; \textbf{\textit{num}} \;\; | \textit{function\_call} \,) \, [\, (\; \textit{binop} \, | \, \textit{boolop} \,) \\
& & (\;\; \textbf{\textit{idx}} \;\; | \;\; \textbf{\textit{num}} \;\; | \textit{function\_call} \,) \;\;]^* \\[4pt]
\textit{filter} & \Rightarrow & \texttt{\textbackslash filter} \;\; \{ \;\; \textbf{\textit{id}} \;\; \verb|^| \;\; \{ \;\; [\;\; \textbf{\textit{id}} \;\;] \;\; \} \\
& & [\;\; \textbf{,} \;\; \textbf{\textit{id}} \;\; \verb|^| \;\; \{ \;\; [\;\; \textbf{\textit{id}} \;\;] \;\; \} \;\;]^* \\
& & | \;\; \textit{extended\_condition} \;\; \} \\[4pt]
\textit{genarray} & \Rightarrow & \texttt{\textbackslash GenAr} \;\; \texttt{\textbackslash limits} \;\; \verb|^| \;\; \{ \; \textit{expr} \; \} \;\; (\;\; \textit{sexpr} \;\;) \\[4pt]
\textit{vector} & \Rightarrow & \texttt{\textbackslash begin} \;\; \{ \;\; \texttt{tvector} \;\; \} \\
& & [\textit{sexpr} \; \texttt{\textbackslash endl} \;\;]+ \\
& & \texttt{\textbackslash end} \;\; \{ \;\; \texttt{tvector} \;\; \} \\[4pt]
\textit{matrix} & \Rightarrow & \texttt{\textbackslash begin} \;\; \{ \;\; \texttt{tmatrix} \;\; \} \; \{ \; [\;\; \textbf{\textit{id}} \;\;]+ \; \} \\
& & [\textit{sexpr} \, [\;\; \textit{sexpr} \;\; \texttt{\&} \;\;]^* \;\; \texttt{\textbackslash endl} \;\;]+ \\
& & \texttt{\textbackslash end} \;\; \{ \;\; \texttt{tmatrix} \;\; \} \\[4pt]
\textit{expr} & \Rightarrow & \textit{sexpr} \\
& | & \textit{filter} \\
& | & \textit{genarray} \\
& | & \textit{vector} \\
& | & \textit{matrix} \\[4pt]
\textit{with\_loop} & \Rightarrow & \textit{with\_loop\_wbr} \\
& | & \textit{with\_loop\_wobr} \\[4pt]
\textit{with\_loop\_wbr} & \Rightarrow & \textit{idx} \;\; | \;\; \textit{extended\_condition} \;\; \texttt{=} \\
& & \texttt{\textbackslash begin} \;\; \{ \;\; \texttt{cases} \;\; \} \\
& & [\textit{expr} \;\; \texttt{\&} \;\; \textit{extended\_condition} \;\;]+ \\
& & [\textit{expr} \;\; \texttt{\&} \;\; \texttt{\textbackslash otherwise} \;\;]+ \\
& & \texttt{\textbackslash end} \;\; \{ \;\; \texttt{cases} \;\; \} \\[4pt]
\textit{with\_loop\_wobr} & \Rightarrow & \textit{idx} \;\; | \;\; \textit{extended\_condition} \;\; \texttt{=} \;\; \textit{expr} \\[4pt]
\textit{return} & \Rightarrow & \texttt{\textbackslash return} \;\; \{ \;\; \textit{expr} \;\; \}
\end{array}
$$