You can use this package by doing `\usepackage{virginialake}`.
If you don’t need any graphical elements (most of which have curved lines), you can save some
processing time and \TeX resources by doing `\usepackage[noxy]{virginialake}`. In this case,
the package does not load \Xy-pic.

For elements with curved lines there are two options:

- compile the \LaTeX file with \texttt{latex} + \texttt{dvips}: this takes longer but gives a better output;
- compile with \texttt{pdflatex}: in this case, some graphical elements will have lower quality, but
  compilation is faster.

Calling the package with `\usepackage[goodsyntax]{virginialake}` produces formulae or
structures in the deep-inference style.

Calling the package with `\usepackage[lutzsyntax]{virginialake}` produces formulae or
structures in the traditional style, except that it uses square brackets for disjunctions.

In order to use \texttt{virginialake} with \texttt{beamer} either the package is loaded with the \texttt{[noxy]} option,
or `\usepackage[etex]{etex}` needs to be invoked immediately after `\documentclass`; this latter option
loads the e-\TeX extension, which is needed to deal with the massive resources required.

**For use with Beamer**  Note that inside the \texttt{frame} environment in \texttt{beamer} the parentheses and
punctuation marks for formulae and structures are active. This can cause problems, notably when
using square brackets for optional arguments or round brackets for atomic flow coordinates. The
solution is to load whatever is needed outside of the frame and putting it in a box. If this behaviour
is undesired, load the package as `\usepackage[noframevls]{virginialake}`: if so, formulae
and structures might still be entered, but only by using the regular macros provided.
1. **Symbols**

The following symbols are defined:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>l</td>
<td>\texttt{l}</td>
</tr>
<tr>
<td>f</td>
<td>\texttt{f}</td>
</tr>
<tr>
<td>t</td>
<td>\texttt{t}</td>
</tr>
<tr>
<td>s</td>
<td>\texttt{sw}</td>
</tr>
<tr>
<td>m</td>
<td>\texttt{me}</td>
</tr>
<tr>
<td>i↓</td>
<td>\texttt{iD}</td>
</tr>
<tr>
<td>i↑</td>
<td>\texttt{iU}</td>
</tr>
<tr>
<td>c↓</td>
<td>\texttt{cD}</td>
</tr>
<tr>
<td>c↑</td>
<td>\texttt{cU}</td>
</tr>
<tr>
<td>w↓</td>
<td>\texttt{wD}</td>
</tr>
<tr>
<td>w↑</td>
<td>\texttt{wU}</td>
</tr>
<tr>
<td>BV</td>
<td>\texttt{BV}</td>
</tr>
<tr>
<td>SBV</td>
<td>\texttt{SBV}</td>
</tr>
<tr>
<td>KS</td>
<td>\texttt{KS}</td>
</tr>
<tr>
<td>SKS</td>
<td>\texttt{SKS}</td>
</tr>
</tbody>
</table>

2. **Formulae and Structures**

Normal formulae, with special logical operators (smaller than usual unless \texttt{\vlsmallopsfalse} is issued):

\[(A \lor (B \land C) \rightarrow \neg D) \rightarrow F\]  
\[((A \lor (B \land C) \land \neg D) \land \neg E) \land I F\]  
\[(A \supset (B \subset C))\]  
\[(A \vlinj (B \vlinj C))\]  
\[(A \oplus (B \otimes (C \triangleright D))) \rightarrow E\]  
\[(A \vlp (B \vlte (C \vls D))) \vlli E\]

The command \texttt{\vllineartrue} triggers linear logic additive conjunction and disjunction. It is reversed by \texttt{\vllinearfalse}, which is the default:

\[(A \oplus (B \otimes C) \rightarrow \neg D) \rightarrow E\]  
\[(\vllineartrue (A \lor (B \land C) \land \neg D) \land \neg E) \land I F\]

The macro \texttt{\vlbin} creates a logical operator: \textit{e.g.}, \texttt{\vls} is \texttt{\vlbin\triangleleft}.  

2
Note that the new macros \lt and \gt are defined, respectively, for < and > (whose corresponding ASCII characters have special meaning when dealing with formulae).

It is possible to use punctuation marks instead of macros for representing connectives. The following happens if the package is called without the option [good-syntax], or if the command \vlnogoodsyntax is issued:

\[ A \lor \bar{B} \{ \vls[A.-B] \} \]
\[ A \lor \bar{B} \lor \cdots \lor D \lor E \{ \vls[A.-B.ldots.D.E] \} \]
\[ A \lor (B \land (C \lor (D \lor (E \lor F)))) \lor G \{ \vls[A.(.-B.\\{C;<D;(E;F)>\})].G] \} \]
\[ (A \lor (B \land (C \lor (D \lor (E \lor F)))) \lor G) \{ \vlsbr[A.(.-B.\\{C;<D;(E;F)>\})].G] \} \]
\[ A \lor (B \land (C \lor (D \lor (E \lor F)))) \lor G \{ \vlscn[A.(.-B.\\{C;;<D;;(E;;F)>\})].G] \} \]
\[ A\{ \} A\vhl \]

The following happens if the package is called with the option [good-syntax], or if the command \vlgoodsyntax is issued:

\[ [A \bar{B}] \{ \vls[A.-B] \} \]
\[ [A \bar{B} \ldots D \ E] \{ \vls[A.-B.ldots.D.E] \} \]
\[ [A \ (B \ [C \ (D \ (E \ F))]) \ G] \{ \vls[A.(.-B.\\{C;<D;(E;F)>\})].G] \} \]
\[ [A \ (B \ [C \ (D \ (E \ F))]) \ G] \{ \vlsbr[A.(.-B.\\{C;<D;(E;F)>\})].G] \} \]
\[ [A \ (B \ [C \ (D \ (E \ F))]) \ G] \{ \vlscn[A.(.-B.\\{C;;<D;;(E;;F)>\})].G] \} \]
\[ A\{ \} A\vhl \]
The following happens if the package is called with the option \lutzsyntax, or if the command \vlutzsyntax is issued:

\[
A \lor \bar{B} \quad \{\vls[A.-B]\}
\]

\[
A \lor \bar{B} \lor \cdots \lor D \lor E \quad \{\vls[A.-B.\vldots.D.E]\}
\]

\[
A \lor (\bar{B} \land [C \lor (D \land (E \lor F))]) \lor G \quad \{\vls[A..(\lor C..D.;;E;F)].G]\}
\]

\[
[A \lor (\bar{B} \land [C \lor (D \land (E \lor F))]) \lor G] \quad \{\vlsbr[A.-B..(\lor C..D.;;E;F)].G]\}
\]

\[
[A \lor (\bar{B} \land [C \lor (D \land (E \lor F))]) \lor G] \quad \{\vlschn[A.-B..(\lor C.;;D.;;E;F)]].G]\}
\]

\[
A\{\quad A\vlhole
\]

\[
A\{\quad A\vlhole
\]

The command \vlsmallbrackets corrects a possible problem with the size of brackets:

\[
(a \lor b) \land (\bar{a} \lor \bar{b}) \quad \{\vls([a..b].[-a..-b])}\]

\[
(a \lor b) \land (\bar{a} \lor \bar{b}) \quad \{\vlsmallbrackets \vls([a..b].[-a..-b])}\]

This also holds for the alternative syntax style:

\[
([a..b] \: [\bar{a}..\bar{b}]) \quad \{\vls([a..b].[-a..-b])}\]

\[
([a..b] \: [\bar{a}..\bar{b}]) \quad \{\vlsmallbrackets \vls([a..b].[-a..-b])\}
\]

The command \vlnosmallbrackets undoes \vlsmallbrackets.
Notice the difference between the following two displays; the second has better spacing:

\[ C(a \land b) \quad \{C\vlsbr(a.b)\} \]
\[ C(a \land b) \quad \{C\{\vlsbr(a.b)\}\} \]

The \vls macro works by redefining '.', '[', ']' and '('. This, of course, can cause several problems. In practice, they are rare, except when \vls is an argument of a macro. In this case, one needs to 'update' the macro by calling \vlupdate. Compare

\[ [a.b] \quad \newcommand{\vltest}[1]{#1} \]
\[ \vltest{\vls[a.b]} \]

with

\[ a \lor b \quad \vlupdate\vltest \]
\[ \vltest{\vls[a.b]} \]

This mechanism, in principle, works with every macro. Sometimes it is not possible to use \vlupdate. For example, in the following situation (requiring the amsmath package):

\[
\begin{align*}
\beta_k &= \bigwedge_{k \leq i \leq n} [-c_i - d_i] & \text{for } 1 < k \leq n \quad , \\
\gamma_i &= \beta_{i+1}.c_i & \text{for } 1 \leq i < n \quad , \\
\delta_i &= \beta_{i+1}.d_i & \text{for } 1 \leq i < n \quad , \\
\gamma_n &= c_n \quad , \\
\delta_n &= d_n \quad .
\end{align*}
\]

The solution is to use the macros \vlstore, \vlread and \lt as follows:

\[
\begin{align*}
\beta_k &= \bigwedge_{k \leq i \leq n} \vls[c_i \lor d_i] & \text{for } 1 < k \leq n \quad , \\
\gamma_i &= \beta_{i+1} \land c_i & \text{for } 1 \leq i < n \quad , \\
\delta_i &= \beta_{i+1} \land d_i & \text{for } 1 \leq i < n \quad , \\
\gamma_n &= c_n \quad , \\
\delta_n &= d_n \quad .
\end{align*}
\]

\[
\begin{align*}
\vlstore{\%} \quad \\
\beta_k &== \text{\textup{\textbackslash{}bigwedge_{k \leq i \leq n} \textup{\textbackslash{}vls[-c_i - d_i]}}} \quad \text{for } 1 < k \leq n \quad \text{\quad \textup{\textbackslash{}vldot}} \quad , \\
\gamma_i &== \text{\textup{\textbackslash{}text{\textbackslash{}beta_{i+1}.c_i}}} \quad \text{for } 1 \leq i < n \quad , \\
\delta_i &== \text{\textup{\textbackslash{}text{\textbackslash{}beta_{i+1}.d_i}}} \quad \text{for } 1 \leq i < n \quad , \\
\gamma_n &== c_n \quad , \\
\delta_n &== d_n \quad .
\end{align*}
\]

\[
\begin{align*}
\vlread{} \\
\end{align*}
\]
Notice the use of \vldot in the place of . in the last line of the display. The commands \vldot for . and \vlsqbrl for [ and \vlrsqbr for ] and \vlrobrl for ( and \vlrobrr for ) are provided.

There’s the command \vlnos, which sets ‘,’ [‘, ]’ [‘ and ]’ to their normal behaviour, for example:

\[
a \land ([b \land]) \quad \{\vls(a.\{\vlnos (.[{\vls(b.c)}].))\}
\]
3. Calculus of Structures and sequent calculus derivations

The following macros, by default, accept the commands for formulae/structures, as shown before. However, this might create problems in some circumstances, because the characters ‘.’, ‘[’, ‘]’, ‘{’ and ‘}’ are defined in a special way. To avoid such problems, in case the commands for formulae/structures are not wanted, you can use the command \vlnostructuressyntax: every successive invocation of the commands for derivations does not redefine any character.

\vlproof{\Pi}{\cal S}{\vls[T.U]}
The commands \texttt{\vlin}\texttt{\veri}\texttt{\vliq}\texttt{\vlid}\texttt{\vlinf} control the size of labels at the left of --- (the $\rho$s above); the default is small size.
\[
\text{Note } \vdots \text{ in }
\]
The command \vlx provides for some extra space, as in

\begin{equation}
\frac{t}{a \lor \tilde{a}} \land (\tilde{a} \lor \tilde{a})
\end{equation}

\begin{align*}
\Psi' & \Rightarrow \beta \\
\Psi & \Rightarrow \xi\{\left\{ \begin{array}{c}
\frac{a}{a \land a} \\
\frac{a \land (a \land \tilde{a}) \lor \tilde{a}}{a \land \tilde{a} \lor a \land \tilde{a}} \\
\frac{f}{f}
\end{array} \right\} \quad \frac{\alpha}{a \lor \tilde{a}} \land (\tilde{a} \lor \tilde{a})} \land (\tilde{a} \lor \tilde{a})
\end{align*}
The following uses "\texttt{XY-pic}\) (see at the beginning of this manual for instructions).
4. Open Deduction

The following macros for open deduction derivations are more intuitive than the previous ones because they do not reverse the order of formulae (which is somewhat more convenient for Gentzen trees).

\[
\Pi \vdash S \\
T \lor U \quad \od{\odp{\Pi}\{[T.U]\}{\text{cal } S}}
\]

\[
\Pi \vdash S \\
T \lor U \quad \od{\odP{\Pi}\{[T.U]\}{\text{cal } S}}
\]

\[
\Pi \vdash S \\
T \lor U \quad \toks0=3.2 \\
\od{\odpx{\Pi}\{[T.U]\}{\text{cal } S}{\the\toks0}}
\]

\[
\Pi \vdash S \\
T \lor U \quad \odr{\Pi}\{[T.U]\}{\text{cal } S}
\]

\[
\Pi \vdash S \\
T \lor U \quad \odR{\Pi}\{[T.U]\}{\text{cal } S}
\]

\[
\Delta \vdash S \\
T \lor U \quad \od{\odD{\Delta}\{[T.U]\}{\text{cal } S}}
\]

\[
\Delta \vdash S \\
T \lor U \quad \od{\odD{\Delta}\{[T.U]\}{\text{cal } S}}
\]

\[
\Delta \vdash S \\
T \lor U \quad \toks0=2.5 \\
\od{\odx{\Delta}\{[T.U]\}{\text{cal } S}{\the\toks0}}
\]
\[
\begin{align*}
R & \quad \Delta^S \quad S' \quad \Delta \quad T \quad \{R\} \\
U & \quad \Delta' \quad U \quad \{\Delta'\}\{U\}\{\cal S'\} \\
V & \quad \Delta'' \quad V \quad \{\Delta''\}\{V\}\{\cal S\} \\
\end{align*}
\]

\[
\begin{align*}
R & \quad \rho \quad T \quad \{\rho\}\{T\}\{} \\
U & \quad \rho' \quad U \quad \{\rho'\}\{U\}\{} \\
V & \quad \rho'' \quad V \quad \{\rho''\}\{V\}\{\quad.\} \\
\end{align*}
\]

\[
\begin{align*}
A \not\equiv B \\
\begin{array}{|c|}
\hline
a \not\equiv b \\
\hline
b \otimes b \\
\hline
\bot \\
\hline
(w \otimes b) \\
\hline
\end{array}
\end{align*}
\]

\[
\begin{align*}
i & = a \\
m & = a \lor t \\
\end{align*}
\]

\[
\begin{align*}
(a \lor t) \land \frac{t \lor \bar{a}}{a \lor t} \\
\end{align*}
\]

\[
\begin{align*}
(a \lor t) \land \bar{a} \\
\frac{a \land a}{t} \\
\end{align*}
\]

You can suppress the background colour and the frames, respectively, with the commands \odbackgroundfalse and \odframefalse.
5. Atomic Flows

The following uses \texttt{XY-pic} (see at the beginning of this manual for instructions).

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afid abcd}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afidc abcd\{red\}\{green\}}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afidx abcd45}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afidxc abcd45\{red\}\{green\}}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afiu abcd}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afiu abcd\{red\}\{green\}}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afiu abcd32}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afiu xc abcd32\{red\}\{green\}}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afidn}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\text{a} \quad \text{b} \quad \text{c} \quad \text{d} \\
\text{afiun}
\end{array}
\end{array}
\]
The three macros \texttt{\textbackslash aftrim}, \texttt{\textbackslash aftrimabove} and \texttt{\textbackslash aftrimbelow} trim extra space above and below diagrams including \texttt{\textbackslash afiu} and similar macros.

\begin{verbatim}
\texttt{\textbackslash aftrim\{af\{(0,0)*\{afwun\}\}}
\end{verbatim}

\begin{verbatim}
\texttt{\textbackslash aftrimabove\{af\{(0,0)*\{afid{}{}{}{}}\}}
\end{verbatim}

\begin{verbatim}
\texttt{\textbackslash aftrimbelow\{af\{(0,0)*\{afwu{}{}}\}}
\end{verbatim}

Use the macros \texttt{\textbackslash afraise} and \texttt{\textbackslash aflower}, typically with one atomic flow as an argument, to raise or lower a bit the atomic flow (see examples in the following).
\text{afCdx abcdef41}

\text{afCdxc abcdef72\{red\}\{green\}\{blue\}}

\text{afCdnx abcd83}

\text{afCdnxc abcd83\{red\}\{green\}}

\text{afCux abcdef41}

\text{afCuxc abcdef72\{red\}\{green\}\{blue\}}

\text{afCunx abcd83}

\text{afCunxc abcd83\{red\}\{green\}}
\text{afCdX} \ abcdef41
\text{afCdXc} \ abcdef72\{\text{red}\}\{\text{green}\}\{\text{blue}\}
\text{afCdnX} \ abcd83
\text{afCdnXc} \ abcd83\{\text{red}\}\{\text{green}\}
\text{afCuX} \ abcdef41
\text{afCuXc} \ abcdef72\{\text{red}\}\{\text{green}\}\{\text{blue}\}
\text{afCunX} \ abcd83
\text{afCunXc} \ abcd83\{\text{red}\}\{\text{green}\}
\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcdef} \]

\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcdef\{red\}{green}\{blue\}} \]

\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcd} \]

\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcd\{red\}} \{green\} \]

\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcdef} \]

\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcdef\{red\}{green}{blue\}} \]

\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcd} \]

\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcd\{red\}} \{green\} \]

\[ a \backslash \{ b, c \}/ \] 
\[ \backslash f \] 
\[ \backslash \text{abcdef} \]
By default the above background colour is defined as \newxycolor{afbackground}{0 0 0 0.12 cmyk}.

The following \texttt{dimen} parameters are defined:

\begin{verbatim}
\afelwidth = 425 \afunit
\afelheight = 325 \afunit
\afthickone = 60 \afunit
\afthicktwo = 40 \afunit
\afthickthree = 160 \afunit
\afthickfour = 120 \afunit
\afthickfive = 40 \afunit
\aflabeldistance = 220 \afunit
\end{verbatim}

The registers govern various parameters in the atomic flow elements (experiment to see which ones). You might be interested especially in changing the last one. The parameters can be globally scaled by invoking \texttt{afsetparams} after having adjusted \texttt{afunit}, which by default is 0.01pt.
Each line starting with a coordinate pair \((x, y)\) is an element of the picture; just experiment turning them on and off by commenting them. The coordinates are relative, so, for example, you can add or subtract the same vector to all of them and still get the same picture.

\[
\begin{align*}
\text{\textbackslash af}\{ & (0,8)\ast\{\text{afcd }a\}{}\{\}a\}{}; \\
& (0,0)\ast\{\text{afcu }a\}{}\{\}a\}{}
\end{align*}
\]

\[
\begin{align*}
\text{\textbackslash af}\{ & (2,12)\ast\{\text{afcu}\}{}\{\}{}\{\}a\}; \\
& (8,12)\ast\{\text{afcu}\}{}\{\}{}\{\}a\}; \\
& (0,6)\ast\{\text{afv4}\}; \\
& (5,6)\ast\{\text{afex24}\}; \\
& (10,6)\ast\{\text{afv4}\}; \\
& (2,0)\ast\{\text{afcd}\}{}\{\}{}\{\}a\}; \\
& (8,0)\ast\{\text{afcd}\}{}\{\}{}\{\}a\}
\end{align*}
\]

\[
\begin{align*}
\text{\textbackslash af}\{ & (4,4.5)\ast\{\text{afvdj}\}; \\
& (0,5)\ast\{\text{afcd }a\}{}\{\}a\}{}; \\
& (2,0)\ast\{\text{afiu }a\}{}\{\bar{}a\}{}
\end{align*}
\]

\[
\begin{align*}
\text{\textbackslash aflower}\{\text{\textbackslash af}\{ & (6,6)\ast\{\text{afvd4}\}{}\{\}{}\{}; \\
& (3,0)\ast\{\text{afiuux}\}{}\{\}{}32; \\
& (0,4)\ast\{\text{afcdn}\}{}\{\}{}\{\}
\end{align*}
\]

\[
\begin{align*}
\text{\textbackslash quad}\to\text{\textbackslash quad}\quad\text{\textbackslash aflower}\{\text{\textbackslash af}\{ & (6,6)\ast\{\text{afcu}\}{}\{\}{}\{}; \\
& (0,6)\ast\{\text{afvd8}\}{}\{}; \\
& (12,6)\ast\{\text{afvd8}\}{}\{}; \\
& (10,2)\ast\{\text{afiuun}; \\
& (2,2)\ast\{\text{afiuun}}
\end{align*}
\]

\[
\begin{align*}
\text{\textbackslash aflower}\{\text{\textbackslash af}\{ & (6,6)\ast\{\text{afVd4}\}{}\{\}{}\{}; \\
& (3,0)\ast\{\text{afIux}\}{}\{\}{}32; \\
& (0,4)\ast\{\text{afCd4}\}{}\{\}{}\{\}
\end{align*}
\]

\[
\begin{align*}
\text{\textbackslash quad}\to\text{\textbackslash quad}\quad\text{\textbackslash aflower}\{\text{\textbackslash af}\{ & (6,6)\ast\{\text{afCu}\}{}\{\}{}\{}; \\
& (0,6)\ast\{\text{afVd8}\}{}\{}; \\
& (12,6)\ast\{\text{afVd8}\}{}\{}; \\
& (10,2)\ast\{\text{afiuun}; \\
& (2,2)\ast\{\text{afiuun}}
\end{align*}
\]

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In the next two pictures, notice how vertical symmetry is achieved.

\[
\begin{align*}
\text{\textbackslash af}\{ \\
(10, 20.5)*{\textbackslash \textbackslash vdj}; \\
(4, 18)*{\textbackslash \textbackslash vd}{12}\{a}; \\
(0, 16)*{\textbackslash \textbackslash vd}{16}a\{}; \\
(10, 16)*{\textbackslash \textbackslash fcu}\{}{}{}{}{{\textbackslash \textbackslash bar a}}; \\
(6, 10)*{\textbackslash \textbackslash fe44}; \\
(12, 10)*{\textbackslash \textbackslash fv4}; \\
(2, 4)*{\textbackslash \textbackslash fiu a}\{}{}{{\textbackslash \textbackslash bar a}}; \\
(10, 4)*{\textbackslash \textbackslash fiu a}\{}{}{{\textbackslash \textbackslash bar a}}
\end{align*}
\]\n
\[
\begin{align*}
\text{\textbackslash afinv}\{ \\
(10, 20.5)*{\textbackslash \textbackslash vdj}; \\
(4, 18)*{\textbackslash \textbackslash vu}{12}\{a}; \\
(0, 16)*{\textbackslash \textbackslash vu}{16}a\{}; \\
(10, 16)*{\textbackslash \textbackslash cd}\{}{}{}{}{{\textbackslash \textbackslash bar a}}; \\
(6, 10)*{\textbackslash \textbackslash fe44}; \\
(12, 10)*{\textbackslash \textbackslash fv4}; \\
(2, 4)*{\textbackslash \textbackslash fid a}\{}{}{{\textbackslash \textbackslash bar a}}; \\
(10, 4)*{\textbackslash \textbackslash fid a}\{}{}{{\textbackslash \textbackslash bar a}}
\end{align*}
\]\n
\[
\begin{align*}
\text{\textbackslash af}\{ \\
(4, 4.5)*{\textbackslash \textbackslash vdj}; \\
(0, 5)*{\textbackslash \textbackslash cd a}\{}{}{}{}{}; \\
(1, 2.5)*{\textbackslash \textbackslash fr}{10}\{}{}{}{}{}; \\
(2, 0)*{\textbackslash \textbackslash fiu a}\{}{}{}{}{}{{\textbackslash \textbackslash bar a}}
\end{align*}
\]\n
\[
\begin{align*}
\text{\textbackslash af}\{ \\
(4, 16)*{\textbackslash \textbackslash id}\{}{}{}{}{}{}; \\
(0, 8)*{\textbackslash \textbackslash cd}\{}{}{}{}{}{}; \\
(5, 8)*{\textbackslash \textbackslash jr28}; \\
(2, 0)*{\textbackslash \textbackslash fiu}{}{}{}{}{}{}
\end{align*}
\]\n
\[
\begin{align*}
\text{\textbackslash af}\{ \\
(4, 16)*{\textbackslash \textbackslash id}\{}{}{}{}{}{}; \\
(0, 8)*{\textbackslash \textbackslash cd}\{}{}{}{}{}{}; \\
(6, 8)*{\textbackslash \textbackslash fv8}; \\
(3, 0)*{\textbackslash \textbackslash iux}\{}{}{}{}{}{32}
\end{align*}
\]
\newbox\boxone
\setbox\boxone=\hbox{$\divide \afunit by5
\multiply\afunit by3\afsetparams
\af{(0,0)*{\afcd{}{}{}{}{}{}}}\$}
\newbox\boxtwo
\setbox\boxtwo=\hbox{$\divide \afunit by5
\multiply\afunit by3\afsetparams
\af{(0,0)*{\afid{}{}{}{}{}{}}}\$}
\newbox\boxthree
\setbox\boxthree=\hbox{$\divide \afunit by5
\multiply\afunit by3\afsetparams
\af{(0,0)*{\afiu{}{}{}{}{}{}}}\$}
\newbox\boxfour
\setbox\boxfour=\hbox{$\divide \afunit by5
\multiply\afunit by3\afsetparams
\af{(0,0)*{\afv6}}\$}
\newbox\boxfive
\setbox\boxfive=\hbox{$\divide \afunit by5
\multiply\afunit by3\afsetparams
\af{(0,0)*{\afcu{}{}{}{}{}{}}}\$}
\newbox\boxsix
\setbox\boxsix=\hbox{$\divide \afunit by5
\multiply\afunit by3\afsetparams
\af{(4,8)*{\affr{10}8}; (2,6)*{\afvd4}; (28,38)*{\afwu{}{}}; (22,12); (19,20); (11,20)*{\copy\boxfive}; (36,2)*{\affr{10}8}; (19,0)*{\afwd{}{}}; (36,2)*{\afwd{}{}}; (32,38)*{\cdots}; (36,38)*{\afwd{}{}}; (28,38)*{\copy\boxone}; (22,12)*{\copy\boxone}; (3,40)*{\copy\boxtwo}; (19,40)*{\copy\boxtwo}; (22,12)*{\copy\boxthree}; (19,20)*{\copy\boxsix}; (19,0)*{\afwd{}{}}; (3,40)*{\afv4}; (28,38)*{\afv4}; (36,38)*{\afv4}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive}; (8,4)*{\copy\boxfive}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive}; (2,6)*{\copy\boxfive}; (8,4)*{\copy\boxfive}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive}; (2,6)*{\copy\boxfive}; (8,4)*{\copy\boxfive}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive}; (0,0); (12,12)*{\copy\boxfive}; (0,0); (12,0)*{\copy\boxfive};}$
\af$\af{(0,0); (12,20)*{\copy\boxthree}; (19,20)*{\copy\boxsix}; (19,0)*{\afv4}; (19,0)*{\afv4}; (19,0)*{\afv4}; (19,0); (12,0)*{\copy\boxfour}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}; (19,20); (19,0)*{\afv4}$
6. SMASH MACROS

Compare

\[ \alpha \rho \mathcal{S} \beta \]

with

\[ \vlder{\rho}{\mathcal{S}}{\beta}{\alpha} \]

and

\[ \vlder{\rho}{\mathcal{S}}{\beta}{\alpha} \]
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