This package provides an environment—ND—for typesetting Lemon-style natural deduction proofs. Basically, it creates three minipages for the assumption column, the formula column and the rule column. The first and the third of these figure out how much space they need by themselves, and the space for the second is adjusted accordingly. Lines are typeset in the ND environment with the command \ndl (for natural deduction line). \label and \ref are temporarily redefined within ND for ease of referring to line numbers within a proof. Finally, three user commands are provided for use outside of the environment: \ndref, \awidth and \rwidth.

The ND environment takes 5 optional arguments, namely

\begin{ND}
\end{ND}
\begin{ND}[(title)] [(label)] [(width of assumption column)] [(width of rule column)] [(total width)]
\end{ND}

\ndl\langle\text{assumption list}\rangle\{\langle\text{formula}\rangle\}\{\langle\text{rule}\rangle\}

\ndref\langle\langle\text{proof label}\rangle\rangle\{\langle\text{line label}\rangle\}

\awidth\langle\langle\text{proof label}\rangle\rangle

\rwidth\langle\langle\text{proof label}\rangle\rangle

Within the ND environment, \label and \ref are redefined, so that finding a unique label isn't so difficult (\label picks up the line number of the current line). If you want to refer to line numbers outside of the ND environments in which they have been labelled, you need to use \ndref{\langle\text{proof label}\rangle}\{\langle\text{line label}\rangle\}, since \ref will have gone back to its usual definition. For instance, if you labelled a line number within a proof with the label theproof by writing \label{1}, it can be referred to within the same ND environment simply by writing \ref{1}, but outside of the environment you have to use \ndref{theproof}{1} instead.
width arguments of the ND environment. For instance, if you want a proof to have the same layout as a proof that you’ve labelled theproof, you would begin the new ND environment by writing \begin{ND}[Some name][Some label][\awidth{theproof}][\rwidth{theproof}] The new proof would then not choose its layout according to its own needs, but would simply take over the column widths of the other proof.

For illustration, I include the source code of the following example:

\begin{ND}[Proof][theproof][.8\linewidth]
\ndl{}{\forall x \, x = x}{irrelevant\ but \ true}
\ndl{\ref{1}}{Fa}{A}
\ndl{\ref{2}}{\forall x (Fx \rightarrow Gx)}{A}
\ndl{\ref{2}}{Fa \rightarrow Ga}{3, \ \forall E}
\ndl{\ref{1}, \ref{2}}{Ga}{4, \ 2, \ \rightarrow E}
\ndl{\ref{1}}{\forall x (Fx \rightarrow Gx) \rightarrow Ga}{4, \ 5, \ \rightarrow I}
\ndl{}{Fa \rightarrow (\forall x (Fx \rightarrow Gx) \rightarrow Ga)}{2, \ 6, \ \rightarrow I}
\end{ND}

Note line 7 of this proof.

\begin{ND}[Another Proof][theproof][.8\linewidth]
\ndl{}{a = a}{=$\ \text{I}$}
\ndl{}{\forall x \, x = x}{\ref{1}, \ \forall \text{I}}
\end{ND}

Note line 2 of this proof.

\begin{verbatim}
\begin{ND}[Proof][theproof][.8\linewidth]
\ndl{}{\forall x \, x = x}{irrelevant \ but \ true}
\ndl{\ref{1}}{Fa}{A}
\ndl{\ref{2}}{\forall x (Fx \rightarrow Gx)}{A}
\ndl{\ref{2}}{Fa \rightarrow Ga}{3, \ \forall E}
\ndl{\ref{1}, \ref{2}}{Ga}{4, \ 2, \ \rightarrow E}
\ndl{}{Fa \rightarrow (\forall x (Fx \rightarrow Gx) \rightarrow Ga)}{2, \ 6, \ \rightarrow I}
\end{ND}
\end{verbatim}

Note line \ndref{theproof}{6} of this proof.

\begin{verbatim}
\begin{ND}[Another Proof][theproof][.8\linewidth]
\ndl{}{a = a}{=$\ \text{I}$}
\ndl{}{\forall x \, x = x}{\ref{1}, \ \forall \text{I}}
\end{ND}
\end{verbatim}

Note line \ndref{2}{2} of this proof.

Figure 1: Example