Using the mhequ package

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Here is a simple labelled equation:

\[ \sum_{i=1}^{5} X_i^j X_i^j = y^j. \]  

(1)

Removing or adding the label does not require a change of environment:

\[ \sum_{i=1}^{5} X_i^j X_i^j = y^j. \]

However, if the option \texttt{numberall} is set, then every single equation is numbered. A simple list of equations can be displayed either with one number per equation

\[
\begin{align*}
  f(x) &= \sin(x) + 1, \\
  h(x) &= f(x) + g(x) - 3,
\end{align*}
\]

(2)

(3)

or with one number for the whole list

\[
\begin{align*}
  f(x) &= \sin(x) + 1, \\
  h(x) &= f(x) + g(x) - 3,
\end{align*}
\]

(4)

using only a very small modification in the syntax. Of course, it can also have no number at all:

\[
\begin{align*}
  f(x) &= \sin(x) + 1, \\
  h(x) &= f(x) + g(x) - 3.
\end{align*}
\]

Let us make a first group:

\[
\begin{align*}
  f(x) &= \sin(x) + 1, \\
  g(x) &= \cos(x) - x^2 + 4, \\
  h(x) &= f(x) + g(x) - 3.
\end{align*}
\]

(5a)

(5b)

(5c)

One can refer to the whole block (5) or to one line, like (8a) for example. It is possible to use any tag one likes with the \texttt{\tag} command

\[ x = y. \]  

(*)

Such an equation can be referred to as usual: (\texttt{*}). Of course, \texttt{mhequ} can be used in conjunction with the usual \texttt{equation} environment, but \texttt{mhequ} is great, so why would you want to do this?

\[ x = y + z \]  

(6)
Typesetting several columns of equations is quite easy and doesn’t require 10 different environments with awkward names:

\[
\begin{align*}
  x &= y + z & a &= b + c & x &= v \quad (7) \\
  x &= y + z & a &= b + c & x &= u + 1 \quad (7') \\
  a &= b & (\text{multicol}) \\
  x &= y + z & a^2 &= (b - c)^3 + y
\end{align*}
\]

and also (this is some \text{intertext})

\[
\begin{align*}
  x &= y + z & a &= (b + c)^2 - 5 & \ell &= m \quad (8)
\end{align*}
\]

We can even extend the block (5) much later like

\[
\begin{align*}
  x &= y + z & x &= y + z & f(x) &= b \quad (5d) \\
  x &= y + z & x &= y + z & g(x) &= b \quad (5e) \\
  \sin^2 x + \cos^2 x &= 1 \quad (5f)
\end{align*}
\]

It is possible to change the type of subnumbering and to use the \text{text} command without having to load \text{amstext}, like so

\[
\begin{align*}
  I_1 &= \int_a^b g(x) \, dx, \quad \text{(First equation)} \quad (9A) \\
  I_2 &= \int_a^b g(x^2 - 1) \, dx. \quad \text{(Second equation)} \quad (9B)
\end{align*}
\]