1 Prime equation numbers

First an equation.
\[ A = B \] (1.1)
That was equation (1.1).

Then the same, with a prime on the number.
\[ C = D \] (1.1')
And that was equation (1.1').

Notice, by the way, that when a \texttt{ref} occurs inside a \texttt{tag}, and that \texttt{tag} is then \texttt{label}’ed, a \texttt{ref} for the second \texttt{label} requires \textit{three} runs of L\TeX\ in order to get the proper value. (If you run through the logic of L\TeX’s cross-referencing mechanisms as they apply in this case, you will see that this is necessary.)

2 Subnumbered equations

Here is a,b,c sub-numbering.
\[ A = B \] (2.1a)
\[ D = C \] (2.1b)
\[ E = F \] (2.1c)
That was produced with the \texttt{eqnarray} environment; the middle line was labeled as (2.1b).

An equation following the end of the \texttt{subequations} environment should revert to normal numbering:
\[ H < K \] (2.2)
A check on the labeling: that was equation (2.2).

The sub-numbered equations can be spread out through the text, like this:
\[ A = B \] (2.3a)
The \texttt{subequations} environment can span arbitrary text between subsidiary equations. The only restriction is that if there are any numbered equations inside the \texttt{subequations} environment that break out of the subequation numbering sequence, they would have to be handled specially.
\[ D = C \] (2.3b)
More arbitrary text.
\[ E = F \] (2.3c)
Label check: the middle one was (2.3b)
A final equation for a numbering check.

\[ G = H \]  

(2.4)

That equation was labeled as (2.4).

3 Tests of align, gather, and other AMS-\LaTeX\ environments

The \texttt{align} environment:

\begin{align*}
A + B &= B + A \quad & (3.1a) \\
C &= D + E \quad & (3.1b) \quad \\
E &= F \quad & (3.1c)
\end{align*}

Label check: that was (3.1a), (3.1b), and (3.1c).

The \texttt{align} environment again:

\begin{align*}
A + B &= B + A \quad & (3.2a) \\
C &= D + E \quad & (3.2b) \quad \\
E &= F \quad & (3.2c)
\end{align*}

Label check: that was (3.2a), (3.2b), and (3.2c).

The \texttt{gather} environment. For the third line we refer to one of the numbers in the first \texttt{align} structure.

\begin{align*}
A + B &= B \quad & (3.3a) \\
C &= D + E \quad & (3.3b) \quad \\
E &= F \quad & (3.1c')
\end{align*}

Label check: that was (3.3a), (3.3b), and (3.1c').

The next \texttt{subequations} environment encompasses two separate equations.

A \texttt{split} environment:

\begin{align*}
A = B + C + F \quad & (3.4a) \\
= G
\end{align*}

and a \texttt{multiline} environment:

\begin{align*}
A[B,C][D][E][F][G][H][I][J][K][L][M][N] = \\
H[I][J][K][L][M][N][O][P][Q][R][S][T][U][V][W][X][Y][Z] \quad (3.4b)
\end{align*}

Label check: That was (3.4a) and (3.4b).