Use \[... \]. Do not use $$ ... $$, it is too old.

$$a^2 + b^2 = c^2.$$

Put punctuation in the display math too.

The `equation*` environment from amsmath package is the same as \[... \].

$$e^{i\pi} + 1 = 0. \tag{Euler}$$

Use \tag{...} to name or explain the equation.

The `align*` environment from amsmath package is for multiple equations that allow you to align verbs. (Each equal sign is a verb.)

$$
\begin{aligned}
f(x) &= (x+1)^2 \\
&= x^2 + 2x + 1.
\end{aligned}
\tag{Expand}
$$

The ampersand `&` is the alignment point. The punctuation is needed for the last line.

Use `gather*` to center multiple equations without alignment.

$$
\begin{gathered}
V - E + F = 2, \tag{Euler} \\
E = mc^2. \tag{Einstein}
\end{gathered}
$$

note that each line has a punctuation.