

System of equations

Summary of the environments

Environment names	Description	Notes
<i>gather</i> and <i>gather</i> *	Consecutive equations with an alignment to the center.	
<i>align</i> , <i>align</i> *, <i>aligned</i> and <i>split</i>	Consecutive equations with user-defined alignment.	
<i>flalign</i> and <i>flalign</i> *	Similar to <i>align</i> , but left aligns first equation column, and right aligns last column.	
<i>alignat</i> and <i>alignat</i> *	Takes an argument specifying number of columns. Allows control of the horizontal space between equations.	This environment takes one argument, the number of “equation columns”: count the maximum number of &s in any row, add 1 and divide by 2.
<i>array</i>	Advanced alignment scenario. Enables to control how to columns are aligned.	
<i>multline</i> and <i>multline</i> *	First line left aligned, last line right aligned.	Equation number aligned vertically with first line and not centered as with other environments.
<i>eqnarray</i> and <i>eqnarray</i> *	Similar to <i>align</i> and <i>align</i> *	Not recommended because spacing is inconsistent.

This table is based on the one available on Wikibooks, [L^AT_EX Advanced Mathematics](#).

Grouping and centering equations with *gather*

$$x + 2y - z = 4 \tag{1}$$

$$x + y - 5z = -1 \tag{2}$$

$$2x - z = 10 \tag{3}$$

In addition, the environment *gather** removes the equation numbering. The environment *gathered* and can be used in another mathematical environment.

Align equations with *align*

$$x + 2y - z = 4 \tag{4}$$

$$x + y - 5z = -1 \tag{5}$$

$$2x - z = 10 \tag{6}$$

This environment can also be used to align equations on the same line:

$$\begin{array}{ll} f(x) = ax^2 + bx + c & g(x) = dx^3 \\ f'(x) = 2ax + b & g'(x) = 3dx^2 \end{array}$$

In addition, the environment *align** removes the equation numbering. The environment *aligned* and *split* are the similar to *align* and *align** but can be used in another mathematical environment.

Align equations with *align* and *subequations*

The environment *subequations* changes the way how L^AT_EX counts the equations.

$$x + 2y - z = 4 \tag{7a}$$

$$x + y - 5z = -1 \tag{7b}$$

$$2x - z = 10 \tag{7c}$$

Braces a system of equations

The environment *aligned* is similar to *align*, to be used inside another mathematics environment.

$$\begin{array}{l} \left(\begin{array}{l} x + 2y - z = 4 \\ x + y - 5z = -1 \\ 2x - z = 10 \end{array} \right) \\ \left\{ \begin{array}{l} x + 2y - z = 4 \\ x + y - 5z = -1 \\ 2x - z = 10 \end{array} \right. \end{array}$$

Align equations to the left with *flalign*

$$a = b + c \tag{8}$$

$$= 1 + 1 \tag{9}$$

$$= 2 \tag{10}$$

In addition, the environment *flalign** removes the equation numbering.

Align equations with *alignat*

The environment *alignat* enables to control of the horizontal space between equations. Indeed, no addition space is added between equation, at the opposite of the environment *align*.

The mathematical development below is aligned according the arrow and the equal signs.

$$\sqrt{4x^2} - 1 = 0 \tag{11}$$

$$\Rightarrow \sqrt{4}\sqrt{x^2} = 1 \tag{12}$$

$$\Rightarrow 2|x| = 1 \tag{13}$$

$$\Rightarrow x = \pm \frac{1}{2} \tag{14}$$

This environment takes an argument specifying number of columns. The rule of thumb to determine the argument is to count the maximum number of & symbols on one row, add 1 and divide by 2.

In addition, the environment *alignat** removes the equation numbering. The environment *alignedat* and *alignedat** and can be used in another mathematical environment.

Align equations with *array*

The environment *array* is for more advanced scenario. It is basically the same as *align*, but the columns and their alignment are explicitly indicated. It must be used in the math mode.

$$\left\{ \begin{array}{lcl} x + z & = & y - 4 \\ 5z & = & x + y - 1 \\ 2x - y & = & 10 - y \end{array} \right.$$

Displaying long equations

The environment *multline* can be used to display formula on multiple lines.

$$f(x) = 60x^{15} + 56x^{14} + 52x^{13} + 48x^{12} + 44x^{11} + 40x^{10} + 36x^9 + 32x^8 \\ + 28x^7 + 24x^6 + 20x^5 + 16x^4 + 12x^3 + 8x^2 + 4$$