With the Advanced View of the Canvas Equation Editor, you can input more complicated mathematical text using LaTeX, like matrices, interval notation, and piecewise functions. In case you don't have a lot of LaTeX experience, here are some tips for how to write LaTex for some commonly used mathematics.

More tips can be found in the [Basic View Tips PDF](#).

Formula Definition Operations

The following operations are allowed within the advanced view to create your equations:

Symbols + - = * / ^ ( )	e	sum	tan
abs	round	count	pl
asin	floor	range	if
acos	cell	median	cos
atan	comb	mean	min
log	perm	length	max
in	fact	at	sin
rad_to_deg	rand	last	sort
deg_to_rad	first	reverse	sqrt

Interval Notation (mixed parentheses and brackets)

For interval notation using parentheses on both sides or brackets on both sides, you can use the basic view. Just type (to get ( ) or [to get [ ] in the editor.

Left parenthesis	\left(	infinity symbol	\infty
Left bracket	\left[	negative infinity	-\infty
Right parenthesis	\right)	square root	\sqrt{ }
Right bracket	\right]	fraction	\frac{ }{ }

Below are several examples that should help you construct the LaTeX for the interval notation you need.

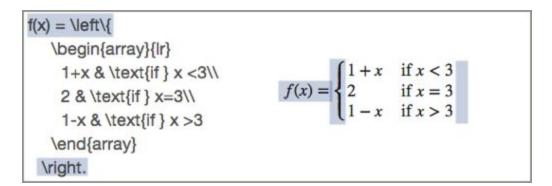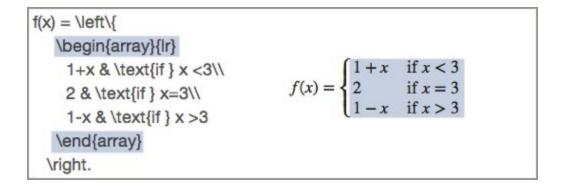| Display	LaTeX in Advanced View
$\left(x,y\right]$	\left(x,y\right]
$\left[x,y\right)$	\left[x,y\right)
$\left[x,y\right)$	\left[-2,\infty\right)
$\left(-\infty,4\right]$	\left(-\infty,4\right]
$\left(\sqrt{5},\frac{3}{4}\right]$	\left(\sqrt{5} ,\frac{3}{4}\right]

Piecewise Functions

You can use the Advanced View of the Canvas Equation Editor to write piecewise functions. To do this, you will need to write the appropriate LaTeX to express the mathematical text (see example below):

```
f(x) = \left\{
    \begin{array}{lr}
    1+x & \text{if } x <3\\
    2 & \text{if } x=3\\
    1-x & \text{if } x >3
    \end{array}
\right.
```

$$f(x) = \begin{cases} 1+x & \text{if } x < 3 \\ 2 & \text{if } x = 3 \\ 1-x & \text{if } x > 3 \end{cases}$$

This kind of LaTeX expression is like an onion - there are many layers. The outer layer declares the function and a resizing brace:

```
f(x) = \left\{
    \begin{array}{lr}
    1+x & \text{if } x <3\\
    2 & \text{if } x=3\\
    1-x & \text{if } x >3
    \end{array}
\right.
```

$$f(x) = \begin{cases} 1+x & \text{if } x < 3 \\ 2 & \text{if } x = 3 \\ 1-x & \text{if } x > 3 \end{cases}$$

The next layer in builds an array to hold the function definitions and conditions:

```
f(x) = \left\{
    \begin{array}{lr}
    1+x & \text{if } x <3\\
    2 & \text{if } x=3\\
    1-x & \text{if } x >3
    \end{array}
\right.
```

$$f(x) = \begin{cases} 1+x & \text{if } x < 3 \\ 2 & \text{if } x = 3 \\ 1-x & \text{if } x > 3 \end{cases}$$

The innermost layer defines the functions and conditions. The symbol & is used to separate the

cells of the array and \\ is used as a line break.

```
f(x) = \left\{
    \begin{array}{lr}
        1+x & \text{if } x <3\\
        2 & \text{if } x=3\\
        1-x & \text{if } x >3
    \end{array}
\right.
```

$$f(x) = \begin{cases} 1+x & \text{if } x < 3 \\ 2 & \text{if } x = 3 \\ 1-x & \text{if } x > 3 \end{cases}$$

Here are some useful symbols and notations to use as you construct piecewise functions:

Non-italicized text: if	\text{if }
Non-italicized text: when	\text{when }
Is an element of	\in
Is not an element of	\notin
Symbol for Real Numbers	\mathbb{R}
Symbol for Integers	\mathbb{Z}
Symbol for Rationals	\mathbb{Q}
Is less than or equal to	\le
Is greater than or equal to	\ge
Is not equal to	\ne

Here is one more example to help with your construction of piecewise functions:

```
f(x) = \left\{
    \begin{array}{lr}
        1 & \text{when } x\in\mathbb{Q}\\
        0 & \text{when } x \notin \mathbb{Q}\\
    \end{array}
\right.
```

$$f(x) = \begin{cases} 1 & \text{when } x \in \mathbb{Q} \\ 0 & \text{when } x \notin \mathbb{Q} \end{cases}$$

Determinants and Matrices

Determinants and matrices have the same general structure to them.

Matrix in parentheses	\begin{pmatrix} and \end{pmatrix}
Matrix in brackets	\begin{bmatrix} and \end{bmatrix}
Determinant	\begin{vmatrix} and \end{vmatrix}

Inside the matrix structure, the symbol & is used to separate elements of the array and the notation \\ is used for line breaks. Here are three examples:

A=\begin{pmatrix}
0 & 2 \\
-1 & 5
\end{pmatrix}
$$A = \begin{pmatrix} 0 & 2 \\ -1 & 5 \end{pmatrix}$$

A=\begin{pmatrix}
0 & 2 \\
-1 & 5
\end{pmatrix}
$$A = \begin{pmatrix} 0 & 2 \\ -1 & 5 \end{pmatrix}$$

A=\begin{bmatrix}
\frac{2}{3} & 2 \\
-1 & \sqrt{5}
\end{bmatrix}
$$A = \begin{bmatrix} \frac{2}{3} & 2 \\ -1 & \sqrt{5} \end{bmatrix}$$

A=\begin{bmatrix}
\frac{2}{3} & 2 \\
-1 & \sqrt{5}
\end{bmatrix}
$$A = \begin{bmatrix} \frac{2}{3} & 2 \\ -1 & \sqrt{5} \end{bmatrix}$$

A=\begin{vmatrix}
10 & -5 \\
0 & 20
\end{vmatrix}
$$A = \begin{vmatrix} 10 & -5 \\ 0 & 20 \end{vmatrix}$$

A=\begin{vmatrix}
10 & -5 \\
0 & 20
\end{vmatrix}
$$A = \begin{vmatrix} 10 & -5 \\ 0 & 20 \end{vmatrix}$$

Any of these can be rewritten in one line, like this:

A=\begin{vmatrix} 10 & -5 \\ 0 & 20 \end{vmatrix}

Note: When the matrix only holds one value, you may need to use the \left and \right delimiters to get the parentheses, brackets, or braces to resize:

A=\left(\frac{1}{2}\right)
$$A = \left(\frac{1}{2}\right)$$

Augmented Matrices

An augmented matrix is built using the same kind of notations as in the previous examples with one new twist:

{ccc|c}	Augmented matrix with 3 columns, one vertical line, 1 column
{ccc|ccc}	Augmented matrix with 3 columns, one vertical line, 3 columns
{cc|cc}	Augmented matrix with 2 columns, one vertical line, 2 columns

The symbol & is used to separate the cells of the array and \\ is used as a line break.

```
\left(\begin{array}{ccc|c}
1 & 2 & 3 & \pi \\
4 & 5 & 6 & \sqrt{5}  \\
7 & 8 & 9 & -3
\end{array}\right)
```

$$\left(\begin{array}{ccc|c} 1 & 2 & 3 & \pi \\ 4 & 5 & 6 & \sqrt{5} \\ 7 & 8 & 9 & -3 \end{array}\right)$$

```
\left(\begin{array}{ccc|ccc}
1 & 2 & 3 & 1 & 0 & 0\\
4 & 5 & 6 & 0 & 1 & 0 \\
7 & 8 & 9 & 0 & 0 & 1
\end{array}\right)
```

$$\left(\begin{array}{ccc|ccc} 1 & 2 & 3 & 1 & 0 & 0 \\ 4 & 5 & 6 & 0 & 1 & 0 \\ 7 & 8 & 9 & 0 & 0 & 1 \end{array}\right)$$

To change to an augmented matrix in brackets, change to using \left[at the beginning and \right] at the end.
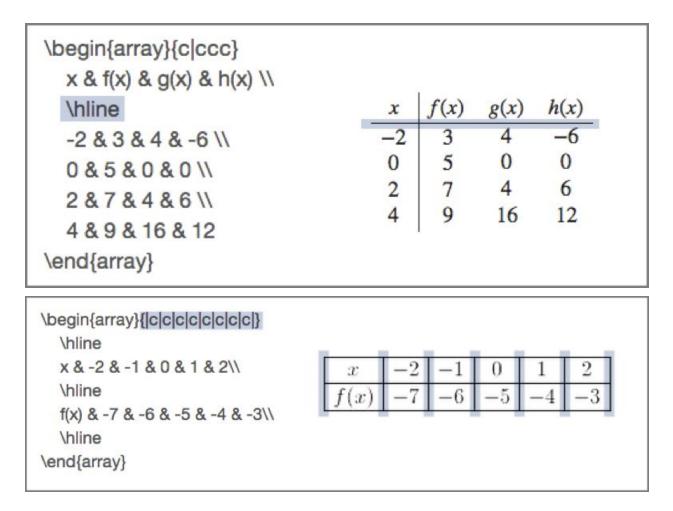
Creating Tables

You can use the Advanced View to make tables as well. This also uses the same basic principles as arrays and matrices with just a few tweaks.

\hline	inserts a horizontal line the width of the array
{c|ccc}	array with 1 column, 1 vertical line, 3 columns
{|c|c|c|c|}	array with vertical lines around all 4 columns

The symbol & is used to separate the cells of the array and \\ is used as a line break. Here are two examples to help you construct a proper table.

\begin{array}{c|ccc}
   x & f(x) & g(x) & h(x) \\
   \hline
   -2 & 3 & 4 & -6 \\
   0 & 5 & 0 & 0 \\
   2 & 7 & 4 & 6 \\
   4 & 9 & 16 & 12
\end{array}

$$\begin{array}{c|ccc} x & f(x) & g(x) & h(x) \\ \hline -2 & 3 & 4 & -6 \\ 0 & 5 & 0 & 0 \\ 2 & 7 & 4 & 6 \\ 4 & 9 & 16 & 12 \end{array}$$

\begin{array}{|c|c|c|c|c|c|}
   \hline
   x & -2 & -1 & 0 & 1 & 2\\
   \hline
   f(x) & -7 & -6 & -5 & -4 & -3\\
   \hline
\end{array}

$$\begin{array}{|c|c|c|c|c|c|} \hline x & -2 & -1 & 0 & 1 & 2 \\ \hline f(x) & -7 & -6 & -5 & -4 & -3 \\ \hline \end{array}$$

LaTeX for Advanced View Examples

These are provided if you'd like to copy and paste the LaTeX from the examples into the Advanced View of the Equation Editor to tinker with the examples.

Interval Notation Examples

\left(x,y\right]

\left[x,y\right)

\left[-2,\infty\right)

\left(-\infty,4\right]

\left(\sqrt{5} ,\frac{3}{4}\right]

Determinants and Matrices

A=\begin{pmatrix}
  0 & 2 \\
  -1 & 5
\end{pmatrix}

A=\begin{bmatrix}
  \frac{2}{3} & 2 \\
  -1 & \sqrt{5}
\end{bmatrix}

A=\begin{vmatrix}
  10 & -5 \\
  0 & 20
\end{vmatrix}

A=\left(\frac{1}{2}\right)

Creating Tables

\begin{array}{c|ccc}
  x & f(x) & g(x) & h(x) \\
  \hline
  -2 & 3 & 4 & -6 \\
  0 & 5 & 0 & 0 \\
  2 & 7 & 4 & 6 \\
  4 & 9 & 16 & 12
\end{array}

\begin{array}{|c|c|c|c|c|c|c|}
  \hline
  x & -2 & -1 & 0 & 1 & 2\\
  \hline
  f(x) & -7 & -6 & -5 & -4 & -3 \\
  \hline
\end{array}

Piecewise Functions

f(x)=\left\{
  \begin{array}{lr}
        1+x & \text{if } x<3 \\
        2 & \text{if } x=3 \\
        1-x & \text{if } x>3
  \end{array}
\right.

f(x)=\left\{
  \begin{array}{lr}
        1 & \text{when }
x\in\mathbb{Q} \\
        0 & \text{when }
x\notin\mathbb{Q}\\
  \end{array}
\right.

Augmented Matrices

\left(\begin{array}{ccc|c}
  1 & 2 & 3 & \pi \\
  4 & 5 & 6 & \sqrt{5} \\
  7 & 8 & 9 & -3
\end{array}\right)

\left(\begin{array}{ccc|ccc}
  1 & 2 & 3 & 1 & 0 & 0 \\
  4 & 5 & 6 & 0 & 1 & 0 \\
  7 & 8 & 9 & 0 & 0 & 1
\end{array}\right)