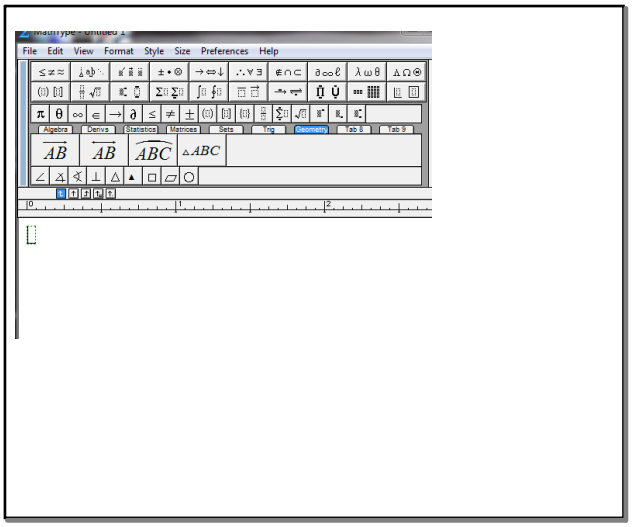

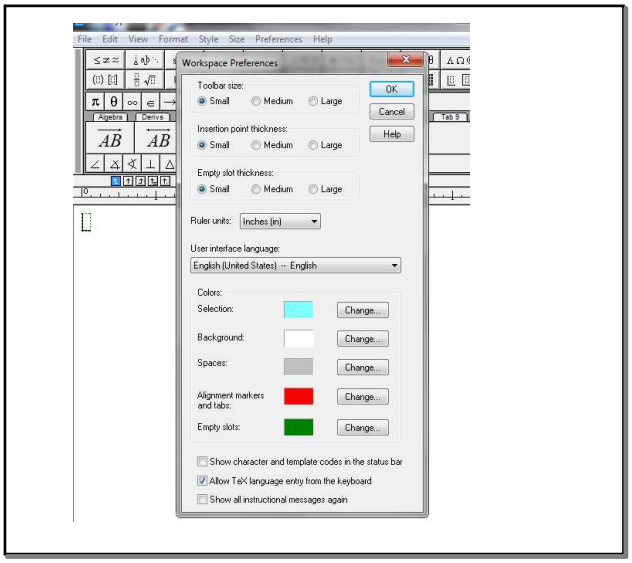

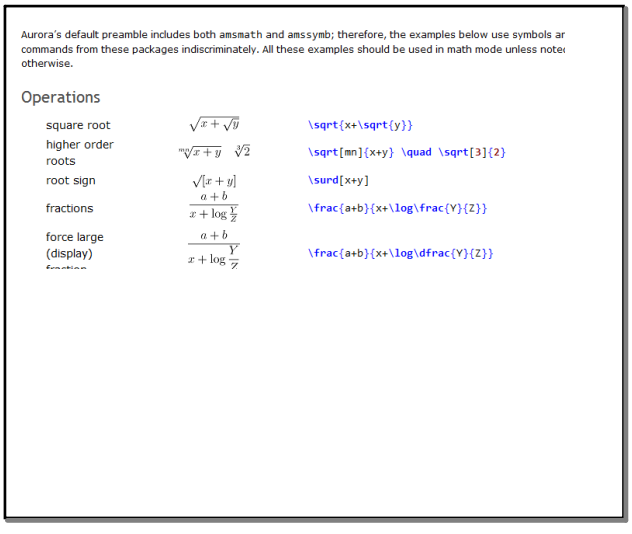

Aurora's default preamble includes both amsmath and amssymb; therefore, the examples below use symbols ar commands from these packages indiscriminately. All these examples should be used in math mode unless note otherwise.

Operations

square root	$\sqrt{x+\sqrt{y}}$	`\sqrt{x+\sqrt{y}}`
higher order roots	$\sqrt[m]{x+y}$ $\sqrt[3]{2}$	`\sqrt[mn]{x+y} \quad \sqrt[3]{2}`
root sign	$\surd[x+y]$	`\surd[x+y]`
fractions	$\frac{a+b}{x+\log\frac{Y}{Z}}$	`\frac{a+b}{x+\log\frac{Y}{Z}}`
force large (display) fraction	$\frac{a+b}{x+\log\frac{Y}{Z}}$	`\frac{a+b}{x+\log\dfrac{Y}{Z}}`

continued fraction

$$1+\cfrac{2}{3+\cfrac{4}{5+\cfrac{6}{7+\cdots}}} = \frac{1}{\sqrt{e}-1}$$

```
1+\cfrac{2}{
  3+\cfrac{4}{
    5+\cfrac{6}{7+\dotsb}}} =
\frac{1}{\sqrt e - 1}
```

binomial

$$\binom{n+1}{k}$$

```
\binom{n+1}{k}
```

prime

$$y'' + y' + y = u$$

```
y'' + y' + y = u
```

"mod"

$$\begin{array}{l} a \bmod n = b \\ a \equiv b \pmod n \\ a \equiv b \mod n \\ a \equiv b \pod n \end{array}$$

```
\begin{array}{l}
  a\bmod n=b \\
  a\equiv b\pmod n \\
  a\equiv b\mod n \\
  a\equiv b\pod n
\end{array}
```

subscripts

$$x_1, x_2 \quad a_{ij}$$

```
x_1, x_2 \quad a_{ij}
```

superscripts

$$x^y \quad e^{2j\pi t} \quad a_{ij}^2$$

```
x^y \quad e^{2j\pi t} \quad
a_{ij}^2
```

multilevel subscripts

$$\sum_{\substack{1\le m\le N,\\ m\text{ odd}}} P(m)$$

```
\sum_{\substack{
      1 \le m \le N, \\
      m\text{ odd}}} P(m)
```

nested sub/superscripts

$$a_{b_j} \quad e^{x^2}$$

```
a_{b_j} \quad e^{x^2}
```

sub- and superscripts before the symbol

$${}_nC_k$$

```
{}_n C_k
```

subscripts and superscripts for large symbols

$$\sideset{^a_b}{'_c}\sum$$

```
\sideset{^a_b}{'_c}\sum
```

Brackets

pairing brackets

$$( ), [ ], \{ \} \quad | \, |, \| \, \| \quad \lceil \, \rceil, \lfloor \, \rfloor \quad \langle \, \rangle$$

```
( \; ), [ \; ], \{ \; \}
\lvert\;\rvert, \lVert\;\rVert
\lceil\;\rceil, \lfloor\;\rfloor
\langle\;\rangle
```

Aurora also defines the following two commands in its default preamble:

absolute value $|u(t)|$

```
\abs{u(t)}
```

norm $\|\hat{G}\|_\infty$

```
\norm{\hat{G}}_\infty
```

To make the brackets scale to the size of the enclosed expression, use *\left* and *\right* commands:

\left *\right*

$$\left(\sum_{i=1}^{n} e^{2\pi j i^2} \right)$$

```
\left(
  \sum_{i=1}^{n} e^{2\pi j i^2}
\right)
```

plain

$$(\sum_{i=1}^{n} e^{2\pi j i^2})$$

```
( \sum_{i=1}^{n} e^{2\pi j i^2} )
```

Alternatively, the bracket size can be specified explicitly using the following commands:

```
\Biggl( \biggl( \Bigl( \bigl( \quad
\Biggr\} \biggr\} \Bigr\} \bigr\}
```

$$\Bigl(\bigl(\Bigl(\bigl(\quad \Bigr\} \bigr\} \Bigr\} \bigr\}$$

This may be necessary when \left and \right commands create delimiters that are visually too large:

\left \right

$$\left[\sum_j\left|\sum_i x_{ij}\right|^2\right]^{1/2}$$

```
\left[ \sum_j
    \left|\sum_i x_{ij}\right|^2
\right]^{1/2}
```

manually-sized

$$\left[\sum_j\left|\sum_i x_{ij}\right|^2\right]^{1/2}$$

```
\biggl[ \sum_j
    \Bigl|\sum_i x_{ij}\Bigr|^2
\biggr]^{1/2}
```

or when \left and \right create brackets of the same size in nested expressions:

\left \right

$$O\left(\left(m^2+n^2\right)\log n\right)$$

```
O\left(\left(
    m^2+n^2\right)\log n\right)
```

manually-sized

$$O\Big(\big(m^2+n^2\big)\log n\Big)$$

```
O\bigl((m^2+n^2)\log n\bigr)
```

piecewise functions/cases

$$a_k = \begin{cases} k & \text{for } k \le n/2 \\ n & \text{for } k = n/2 \\ k-1 & \text{otherwise} \end{cases}$$

```
a_k = \begin{cases}
  k & \text{for $k \le n/2$} \\
  n & \text{for $k=n/2$} \\
  k-1 & \text{otherwise}
\end{cases}
```

multiline equations (aligned at &)

$$\begin{aligned} \tan^2 x &= \sin^2 x/\cos^2 x \\ &= 1/\cos^2 x - 1 \end{aligned}$$

```
\begin{aligned}\tan^2 x
  &= \sin^2 x/\cos^2 x \\
  &= 1/\cos^2 x - 1
\end{aligned}
```

systems of equations

$$\left\{\begin{array}{l} ax+by=r_1 \\ cx+dy=r_2 \end{array}\right.$$

```
\left\{\begin{array}{l}
  ax+by=r_1 \\
  cx+dy=r_2
\end{array}\right.
```

Arrows

Over- and underbraces and other embellishments

overline

$$\overline{A+B}$$

```
\overline{A+B}
```

underline

$$\underline{A+B}$$

```
\underline{A+B}
```

hat

$$\widehat{A+B}$$

```
\widehat{A+B}
```

tilde

$$\widetilde{A+B}$$

```
\widetilde{A+B}
```

vector markers

$$\overrightarrow{AB} \text{ and } \overleftarrow{BA}$$

```
\overrightarrow{AB} \text{ and }
\overleftarrow{BA}
```

overbrace

$$\overbrace{x_1+x_2+\cdots+x_k}^{k \text{ in total}}$$

```
\overbrace{x_1+x_2+\cdots+x_k}^
    {k \text{ in total}}
```

underbrace

$$m^n = \underbrace{m\cdot m\cdots m}_{n}$$

```
m^n=\underbrace{m\cdot m\cdots m}_{n}
```

affixing arbitrary symbols

$$x \overset{?}{\ge} y$$

```
x\overset{?}{\ge}y
```

Function names

To get correct font and spacing around the names of mathematical functions, prefix the function name with \. For example, writing `cos 2\pi\alpha` gives $cos2\pi\alpha$ (incorrect), whereas `\cos 2\pi\alpha` gives $\cos 2\pi\alpha$ (correct). Full list of function names defined in LaTeX is given below:

arccos	`\arccos`	exp	`\exp`	log	`\log`
arcsin	`\arcsin`	gcd	`\gcd`	max	`\max`
arctan	`\arctan`	hom	`\hom`	min	`\min`
arg	`\arg`	inf	`\inf`	Pr	`\Pr`
cos	`\cos`	inj lim	`\injlim`	proj lim	`\projlim`
cosh	`\cosh`	$\varinjlim$	`\varinjlim`	$\varprojlim$	`\varprojlim`
cot	`\cot`	ker	`\ker`	sec	`\sec`
coth	`\coth`	lg	`\lg`	sin	`\sin`
csc	`\csc`	lim	`\lim`	sinh	`\sinh`
deg	`\deg`	lim inf	`\liminf`	sup	`\sup`
det	`\det`	$\varliminf$	`\varliminf`	tan	`\tan`
dim	`\dim`	lim sup	`\limsup`	tanh	`\tanh`
ln	`\ln`	$\varlimsup$	`\varlimsup`		

Matrices

matrix (square-bracketed)

$$\begin{bmatrix} \lambda & & & \\ 1 & \lambda & & \\ \ddots & \ddots & & \\ & 1 & \lambda & \\ & & & \end{bmatrix}_{n\times n}$$

```
\begin{bmatrix}
      \lambda \\
      1 & \lambda \\
      & \ddots & \ddots \\
      & & 1 & \lambda
\end{bmatrix}_{n\times n}
```

alternative delimiters

$$\begin{pmatrix}a\\b\\c\end{pmatrix}, \begin{Bmatrix}a\\b\\c\end{Bmatrix}, \begin{vmatrix}a\\b\\c\end{vmatrix}, \begin{Vmatrix}a\\b\\c\end{Vmatrix}, \begin{matrix}a\\b\\c\end{matrix}$$

```
\begin{pmatrix}a\\b\\c\end{pmatrix},
\begin{Bmatrix}a\\b\\c\end{Bmatrix},
\begin{vmatrix}a\\b\\c\end{vmatrix},
\begin{Vmatrix}a\\b\\c\end{Vmatrix},
\begin{matrix}a\\b\\c\end{matrix}
```

inline matrices

$\left(\begin{smallmatrix}1 & 2\\ 3 & 4\end{smallmatrix}\right)$

```
(\begin{smallmatrix}1 && 2 \\
3 && 4\end{smallmatrix})
```

Punctuation

dots between commas	$x_1, x_2, \ldots, x_n$	`x_1, x_2, \dotsc, x_n`
dots between binary operations	$x_1 + x_2 + \cdots + x_n$	`x_1 + x_2 + \dotsb + x_n`
dots between integrals	$\int\cdots\int$	`\int\dotsi\int`
dots between multiplication signs	$x(x+1)\cdots(x+n)$	`x(x+1)\dotsm(x+n)`
colon (meaning "such that" or when defining domains)	$f\colon \mathbb{N}\to\mathbb{R}$	`f\colon \mathbb{N}\to\mathbb{R}`
vertical and diagonal	$\vdots \quad \ddots$	`\vdots \quad \ddots`

Fraktur (Latin letters and digits only)	$\mathfrak{ABCDEFGHIJKLM}$ $\mathfrak{NOPQRTSUVWXYZ}$ $\mathfrak{abcdefghijklm}$ $\mathfrak{nopqrtsuvwxyz}$ $\mathfrak{0123456789}$	\begin{array}{c} \mathfrak{ABCDEFGHIJKLM} \\ \mathfrak{NOPQRTSUVWXYZ} \\ \mathfrak{abcdefghijklm} \\ \mathfrak{nopqrtsuvwxyz} \\ \mathfrak{0123456789} \end{array}
sans-serif font	$\mathsf{ABCDEFGHIJKLM}$ $\mathsf{NOPQRTSUVWXYZ}$ $\mathsf{abcdefghijklm}$ $\mathsf{nopqrtsuvwxyz}$ $\mathsf{0123456789}$	\begin{array}{c} \mathsf{ABCDEFGHIJKLM} \\ \mathsf{NOPQRTSUVWXYZ} \\ \mathsf{abcdefghijklm} \\ \mathsf{nopqrtsuvwxyz} \\ \mathsf{0123456789} \end{array}
typewriter	$\mathtt{ABCDEFGHIJKLM}$ $\mathtt{NOPQRTSUVWXYZ}$ $\mathtt{abcdefghijklm}$ $\mathtt{nopqrtsuvwxyz}$ $\mathtt{0123456789}$	\begin{array}{c} \mathtt{ABCDEFGHIJKLM} \\ \mathtt{NOPQRTSUVWXYZ} \\ \mathtt{abcdefghijklm} \\ \mathtt{nopqrtsuvwxyz} \\ \mathtt{0123456789} \end{array}

Spacing

The following commands can be used to fine-tune spacing in math mode:

default (none)	xy	x y
quad (width of M)	$x \quad y$	x\quad y
$\frac{3}{18}$ quad	$x\,y$	x\,y
$\frac{4}{18}$ quad	$x\:y$	x\:y
$\frac{5}{18}$ quad	$x\;y$	x\;y
$\frac{1}{3}$ quad	$x\ y$	x\ y
double quad	$x \qquad y$	x\qquad y
–ve $\frac{3}{18}$ quad	xy	x\!y
custom spacing (1 mu = $\frac{1}{18}$ quad)	yx	x\mspace{-19mu}y
virtual space	Γ_{ij}^{k}	\Gamma_{ij}^{k}

Courtesy of

http://elevatorlady.ca/doc/refcard/expressions.html