GeoGebra and LaTeX tips

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Abstract

GeoGebra use JLaTeXMath (a powerful ally) to show mathematical formulas (text and symbols) using LaTeX. The first thing to remember is that LaTeX works in two modes **text mode** and **math mode**. Enter text must be in **text mode** and writing mathematical in **math mode**.

Contents

1 Fonts

By default when checking the box "LaTeX formula" that enters **math mode**(font in italic), if we enter text (roman font) must switch to **text mode** by typing:

```
\text{words}
```

or

```
\mbox{words}
```

1.1 Font size

The size of the fonts can be changed globally with the following commands:

```
\tiny
\scriptsize
\footnotesize
\small
\normalsize
\large
\Large
\LARGE
\huge
\Huge
```

The command `\normalsize` back font to its original size. If you want to combine different font sizes should add the commands in braces `{...}`. This is an example of combination of sizes in **math mode**:

```
{\scriptsize A}{\footnotesize B}{\small C}{\normalsize D}{\large E}{\Large F}{\LARGE G}{\huge H}{\Huge I}
```

$$_{ABCDE}FGHI$$

This is an example of combination of sizes in text/math mode using `\oldstylenums{ ...}` command (only math mode):

```
\text{{\Huge GeoGebra}, the most powerful, {\small since }}\oldstylenums{ 2001-2012}
```

$$\text{{\Huge GeoGebra}, the most powerful, {\small since }}\oldstylenums{ 2001-2012}$$

We can also use the command in text/math mode:

```
\scalebox{h_scale}[v_scale]{...}
```

where `h_scale` is a positive(negative) number (mandatory) and `[v_scale]` is a positive number (optional), numbers can be sliders. for example:

```
\scalebox{2}{\text{{\Huge GeoGebra}, the most powerful, {\small since }}\oldstylenums{ 2001-2012}}
```

$$\scalebox{2}{\text{{\Huge GeoGebra}, the most powerful, {\small since }}\oldstylenums{ 2001-2012}}$$

1.2 Font Family

In **text mode** we have the following families of text, we can use globally or using braces `{...}`:

```
\rm or {\rm }
\sf or {\sf }
\tt or {\tt }
```

This is an example:

```
\text{{\rm GeoGebra}{\sf ,the most powerful}, {\tt since }}\oldstylenums{ 2001-2012}
```

GeoGebra,the most powerful, since 2001-2012

In **math mode** we have the following families (default mathrm):

```
\mathcal{ABC}
\mathrm{abc}
\mathbf{abc}
\mathsf{abc}
\mathit{abc}
\mathtt{abc}
\mathfrak{abc}
\mathbb{ABC}
\mathscr{ABC}
```

For example:

```
\mathbb{G}\mathfrak{e}\mathbf{o}\mathsf{G}\mathscr{E}\mathtt{br}\mathrm{a}
```

$$\mathbb{G}\mathfrak{e}\mathbf{o}\mathsf{G}\mathscr{E}\mathtt{br}\mathrm{a}$$

1.3 Font Series

For **text mode** use `{\bf ...} or \verb...|` and for **math mode** use `\mathbf{...}`, for example:

```
\text{\bf GeoGebra }\mathbf{\sqrt{2012^{2}}}
```

$$\textbf{GeoGebra }\mathbf{\sqrt{2012^{2}}}$$

1.4 Font Shapes

For Small Caps in **text mode** use:

```
\text{{\sc GeoGebra}} or \textsc{GeoGebra}
```

GeoGebra

2 Quotation marks

Straight quotes "..." is a special character for GeoGebra, should never be used directly in LaTeX. For a single quotation marks in **text mode** use:

```
\text{‘Simple’}
```

and for double quotation marks use:

```
\text{‘‘Doble’’}
```

‘Simple’ and “Double”

For more info see http://www.geogebra.org/forum/viewtopic.php?f=8&t=20512&p=77283&hilit=quotes#p77283

3 Horizontal space.

For a single spaced in **text mode** use the space bar for other spaces we have the following commands:

```
\quad
\qquad
\hspace{...}
```

The command \hspace{...} (and \quad, \qquad also available in **math mode**) supports the following units of measurement (positive and negative):

```
pt  point       (1 in = 72.27 pt)
pc  pica        (1 pc = 12 pt)
in  inch        (1 in = 25.4 mm)
bp  big point   (1 in = 72 bp)
cm  centimetre  (1 cm = 10 mm)
mm  millimetre
dd  didot point (1157 dd = 1238 pt)
sp  scaled point (65536 sp = 1 pt)
```

In math mode we have the following commands:

```
\,     a small space
\:     a medium space
\;     a large space
\!     a negative space (moves things back to the left)
```

4 Boxes and Color (In both modes)

4.1 Text and Math in Color

The colors supported directly by JLaTeXMath can be found in http://en.wikibooks.org/wiki/LaTeX/Colors#The_68_standard_colors_known_to_dvips you can use the command:

```
\textcolor{color}{...}
```

For example:

```
\text{\textcolor{WildStrawberry}{Geo}\textcolor{blue}{G}\textcolor{red}{ebra}}\,\textcolor{green}{\oldstylenums{4.2}}
```

4.2 Frame Boxes

For simple frame boxes (no colors) use :

```
\boxed{2012\text{ is now!}}
```

or

```
\fbox{2012\text{ is now!}}
```

2012 is now!

4.3 Color Boxes

A. For a color box (same color in border and background) use:

```
\colorbox{red}{2012\text{ is now!}}
```

2012 is now!

B. For a color box (diferent color in border and background) use:

```
\fcolorbox{blue}{red}{2012\text{ is now!}}
```

2012 is now!

4.4 Rotate Boxes

If you need to rotate a box (or whatever) use:

```
\rotatebox{angle}{...}
```

For example:

```
\rotatebox{45}{\fcolorbox{blue}{red}{2012\text{ is now!}}}
```

4.5 Reflect Boxes

If you need to reflect a box (or whatever) use:

```
\reflectbox{...}
```

For example:

```
\reflectbox{\fcolorbox{blue}{red}{2012\text{ is now!}}}
```

4.6 Phantom Boxes

Sometimes it is necessary to have these phantom boxes,for systems, control the height under a root, alignment on a formula, etc. It has these three commands:

```
\phantom{XXX} space as wide and high as three X's
\hphantom{XXX} space as wide as three X' s; height 0
\vphantom{X} space of width 0, height = height of X
```

For example:

```
\sqrt{b}+\sqrt{\vphantom{b}a}
```

$$\sqrt{b}+\sqrt{a}$$

5 LaTeX environment

JLaTeXMath provides a number of different environments work. Each environment begins and ends in the same manner.

```
\begin{environment}[options]
...
\end{environment}
```

The following environments are supported:

- tabular
- array
- matrix (and variants)
- eqnarray
- align
- cases
- split
- multline

5.1 Tabular and Array

The **tabular** and **array** environment found in similar way, can be used to typeset material with optional horizontal and vertical lines. The options are:

```
l      left-justified column.
c      centered column.
r      right-justified column.
|      vertical line.
||     double vertical line.
&      column separator.
 \\    start new row.
\hline  horizontal line
```

This in an example:

```
\begin{tabular}{ l |c ||r |}
\hline
1 & 2 & 3 \\ \hline
4 & 5 & 6 \\ \hline
7 & 8 & 9 \\
\hline
\end{tabular}
```

1	2	3
4	5	6
7	8	9

Other example , using `\multicolumn` and `array`:

```
\begin{array}{|c|c|}
\hline
\multicolumn{2}{|c|}{\text{Title}} \\
\hline
x & y\\ \hline
a & b\\
c & c\\
d & e\\ \hline
\end{array}
```

Title	
x	y
a	b
c	c
d	e

If you need add column separator (dot for example) and space (1cm), use `@{.\hspace{1cm}}`:

```
\begin{tabular}{r{.\hspace{1cm}}l}
1  & 23 \\
45 &678\\
910& 1112\\
\end{tabular}
```

1.	23
45.	678
910.	1112

5.2 Matrix

A basic matrix may be created using the matrix environment, the structures is similar to table-array , entries are specified by row, with columns separated using `&` and a new rows separated with `\\`. Matrices are usually enclosed in delimiters (default none) of some kind, and while it is possible to use the `\left` and `\right` commands. The predefined environments which automatically include delimiters:

```
pmatrix       ( )
bmatrix       [ ]
Bmatrix       { }
vmatrix       | |
Vmatrix       || ||
```

An example:

```
$\mathsf{A}_{m,n} =
\begin{Vmatrix}
a_{1,1} &a_{1,2} &\cdots &a_{1,n} \\
a_{2,1} &a_{2,2} &\cdots &a_{2,n} \\
\vdots & \vdots & \ddots &\vdots \\
a_{m,1} &a_{m,2} &\cdots &a_{m,n}
\end{Vmatrix}$
```

$$\mathsf{A}_{m,n} = \begin{Vmatrix} a_{1,1} & a_{1,2} & \cdots & a_{1,n} \\ a_{2,1} & a_{2,2} & \cdots & a_{2,n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m,1} & a_{m,2} & \cdots & a_{m,n} \end{Vmatrix}$$

5.2.1 Small Matrix

Sometimes you need to write a matrix within text, for this environment have `smallmatrix`, this works the same way the matrix environment, for example:

```
\mathsf{M} =
\left\{ \begin{smallmatrix}
a&b\\ c&d
\end{smallmatrix} \right\}
```

$$\mathsf{M} = \left\{ \begin{smallmatrix} a & b \\ c & d \end{smallmatrix} \right\}$$

5.3 Eqnarray

This environment is designed to write multiline equations or equations that exceed the width of line, it behaves like an array of three columns where the first aligned right, center second and third left. The equations we want to present in this way must be enclosed between `\begin{eqnarray}` and `\end{eqnarray}`, an example:

```
\begin{eqnarray}
y &=& (x+1)^2 \\
  &=& x^2+2x+1
\end{eqnarray}
```

$$\begin{aligned} y &= (x+1)^2 \\ &= x^2+2x+1 \end{aligned}$$

5.4 Aling

Like eqnarray, but more powerful, you can insert text between lines with the command `\intertext{...}`, for example:

```
\begin{align}
x+y-z &= 1\\
x-y+z &= 1\\
\intertext{text}
2x\hphantom{-y}+z &= 1
\end{align}
```

$$
\begin{aligned}
x+y-z &= 1\\
x-y+z &= 1
\end{aligned}
$$

text

$$
\begin{aligned}
2x\hphantom{-y}+z &= 1
\end{aligned}
$$

5.5 Cases

For piece wise function or definitions use cases environment:

```
\left\vert x\right\vert =
\begin{cases}
\hphantom{-}x &,\, \text{if }x\geq 0 ,\\
-x&,\, \text{if }x<0
\end{cases}
```

$$
\left\vert x\right\vert =
\begin{cases}
\hphantom{-}x &, \text{if } x\geq 0,\\
-x&, \text{if } x<0
\end{cases}
$$

5.6 Split

For split long math block

```
\begin{split}
a& =b+c-d\\
& \quad +e-f\\
& =g+h\\
& =i
\end{split}
```

$$
\begin{aligned}
a &= b+c-d\\
&\quad +e-f\\
&= g+h\\
&= i
\end{aligned}
$$

5.7 Multline

For multiple lines of math

```
\begin{multline}
\left(a+b+c+d+e\right)^2=a^2+b^2+c^2+d^2+e^2\\
+2ab+2ac+2ad+2ae+2bc+2bd+2be+2cd+2ce+2de
\end{multline}
```

$$
\begin{multline}
\left(a+b+c+d+e\right)^2=a^2+b^2+c^2+d^2+e^2\\
+2ab+2ac+2ad+2ae+2bc+2bd+2be+2cd+2ce+2de
\end{multline}
$$