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## Brief Introduction to HKtex (Version 2.04)

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(Notice : This brief introduction is taken from Version 2.00.  
Updated introduction will be released afterward.)

**1. Introduction** HKtex is a formula parsing software written for mobile phones and tablets using Android operating system. It is developed using Google Eclipse and thus allows app developers and book writers to import the files easily. There is now a clear distinction between books and apps. It is difficult to add interactive elements into books written with Tex/Latex and, in creating apps, there is no comprehensive formula parsing software easily imported by Eclipse. The purpose of HKtex is to remove this distinction. HKtex will, intentionally and eventually, enable developers to create apps which are also complete books by themselves, and writers to write books which contain interactive examples, exercises and graphics. In writing HKtex, I understand the popularity of Tex/Latex and thus make HKtex as compatible to Tex/Latex as possible. However, some differences exist. I will try to explain them in this document. Before moving to next section, I wish to emphasize that this is an ongoing endeavour and is by no means a completed work. However, I feel that it is presentable and thus release it to solicit feedback to make it better.

**2. Program structure** HKtex is written with java. Since there are many situations to consider, this program is inherently difficult. Avoid changing the files, except the four input files: MainActivity.java, Header.java, Source.java, and Symbol.java.

The content of the document is stored in Content.java. The content is broken up into blocks. Your document can be contained inside one huge block or many small blocks. Breaking up into smaller blocks allow you to parse a particular block. Each block begins with `\begin{blockline}` and ends with `\end{blockline}`. The `\begin{blockline}` command can be omitted but the `\end{blockline}` command must be there. Besides, you can not begin an environment, e.g. `eqnarray`, in one block and end the environment in another block. The Header.java file contains page layout informations, for example, margins, gap width between lines, etc. You can have more than one Header.java file and use different one in different situation. The Symbol.java file contains symbols. Comment out those symbols that are not used for the purpose of efficiency.

**3. Environment** There are seven different environments in HKtex:

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within table. The following is a simple example :

**Table 1. Infinite products of hyperbolic functions**

	Hyperbolic functions	Infinite Products
1	$\sinh z$	$z \prod_{k=1}^{\infty} \left( 1 + \frac{z^2}{k^2 \pi^2} \right)$
2	$\cosh z$	$\prod_{k=1}^{\infty} \left[ 1 + \frac{4z^2}{(2k-1)^2 \pi^2} \right]$

Using tabular within table is allowed, as demonstrated in the following example:

	Laplace's equations
Cartesian Coordinates:	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} =$ $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 0$
Polar Coordinates:	$r \frac{\partial}{\partial r} \left( r \frac{\partial u}{\partial r} \right) + \frac{\partial^2 u}{\partial \theta^2} =$ $r \frac{\partial}{\partial r} \left( r \frac{\partial v}{\partial r} \right) + \frac{\partial^2 v}{\partial \theta^2} = 0$

**Table 2. Laplace's equations**

Note that there is also no tabular within tabular.

HKtex does not have fbox, this can be compensated somewhat by using table and draws only the lines on the outer boundaries. For example:

The Jacobian of a transformation is :
$\frac{\begin{pmatrix} x,y \\ u,v \end{pmatrix}}{\begin{pmatrix} u,v \\ x,y \end{pmatrix}} = \begin{vmatrix} \frac{\partial x}{\partial u} & \frac{\partial x}{\partial v} \\ \frac{\partial y}{\partial u} & \frac{\partial y}{\partial v} \end{vmatrix}$

Inside table, the default is symbol mode. If text mode is needed, enclosed it within a mbox.

**5. Eqnarray and equation** Equation array is like table except that the font is italic by default. Besides, neither vertical line nor horizontal line will be drawn. Equation is an eqnarray with just one line. You can specified an equation just like an eqnarray. This is allowed in HKtex. The following provides a few examples of equation and eqnarray.

Lagrange's Expansion Formula :

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$$x=x_0 + \sum_{k=1}^{\infty} \frac{(y-y_0)^k}{k!} \left\{ \frac{d^{k-1}}{dx^{k-1}} \left( g'(x) \left[ \frac{x-x_0}{f(x)-y_0} \right]^k \right) \right\}_{x=y_0}$$

Continued fraction :

$$f = b_0 + \frac{a_1}{b_1 + \frac{a_2}{b_2 + \frac{a_3}{b_3 + \frac{a_4}{b_4 + \dots}}}}$$

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Algebraic equation:

$$y = \begin{cases} 0 & x = 1 \\ \frac{|x-1|}{\sqrt{|x-1|^3}} & x \neq 1 \end{cases}$$

Fluid equations:

$$\nabla \cdot \mathbf{U} = 0 \quad \text{continuity}$$

$$\frac{\partial U_j}{\partial t} = \underbrace{\frac{\partial}{\partial x_i} \left( \frac{\partial U_j}{\partial x_i} \right)}_{\text{diffusion term}} + \underbrace{\nu \nabla^2 \mathbf{U}}_{\text{viscosity term}} \quad \text{momentum}$$

**6. Graphics and Graphicstable** Figures can be included within the `\begin{graphics}` and `\end{graphics}` commands.



Figure 1. The left arrow.

If there are more than one figures, then the `\begin{graphicstable}` and `\end{graphicstable}` commands can be used.

Figure 2. The left arrow, the right arrow, the left end arrow and the right end arrow.



**7. Color** Color can only be specified within each environment (except `verbatim`). The following table is a list of color predefined in HKtex. You can easily add another color by adding another entry in the `Color.java` file. The name should not be the same as any other command name. For example the color `tan` is missing because it has the same name as the trigonometric function `tan`.

If table pass beyond the bottom of the view container, it will be move to the next one. However, if the `scrollview` in `Header.java` is specified as `true`, the table will not be moved.

**8. Math Symbols** There are over one thousand symbols in HKtex corresponding to the `asana-math` font with four unicode digits. Besides, common trigonometric, logarithmic, hyperbolic functions and limit are regarded as symbol. They are classified in different types for the purpose of putting the superscript and subscript. Not every symbol has superscript nor subscript. For example, if you assign a superscript to underbrace, the program will stop parsing and an error message will be shown. Refer to `symbol.java` for the available symbols. For optimization, uncomment any symbol that is needed, and comment out any symbol that is not needed.

**9. Final Comment** HKtex is very much an ongoing endeavour. A

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Table 3. Color table

aliceblue	aquamarine	aquamarine		banana	blue
antiquewhite	blueviolet	blue	brick	brown	burlywood
cadetblue	cadmiumorange	cadmiumyellow	carrot	black	burntumber
chocolate	cobalt	cobaltgreen	coldgrey	cornflowerblue	cornsilk
crimson	cyan	darkgoldenrod	darkgray	darkgreen	darkkhaki
cyan	burntsienna	chartreuse	coral	darkolivegreen	darkorange
darkorchid	darksalmon	darkseagreen	darkslateblue	darkslategray	darkturquoise
darkviolet	deeppink	deepskyblue	dinggray	dodgerblue	eggshell
emeraldgreen	firebrick	flor	firebrick	forestgreen	gainsboro
firebrick	gold	goldenrod	gray	green	greenyellow
flor	hotpink	indianred	indigo		ivoryblack
khaki	lavender	lavenderblush	lawngreen	lemonchiffon	lightblue
lightcoral	lightcyan	lightgrey	lightgoldenrod	lightgoldenrodyellow	lightpink
lightsalmon	lightseagreen	lightskyblue	lightslateblue	lightslategray	lightsteelblue
lightyellow	limegreen	lime	magenta	manganesebule	maroon
mediamorchid	mediampurple	mediumseagreen	mediumslateblue	mediumspringgreen	mediumturquoise
mediumvioletred	melon	midnightblue	mint	mintcream	mistyrose
moccasin	navajowhite	navy	oldlace	olivedrab	olive
orange	orangered	orchid	palegoldenrod	palegreen	palevioletred
paleturquoise	papayawhip	peachpuff	peacock	pink	plum
powderblue	purple	raspberry	rawsienna	red	royalblue
rosybrown	salmon	sandybrown	sagegreen	sandybrown	sepia
sienna	silver	skyblue	slateblue	slategray	
springgreen	steelblue	teal	thistle	tomato	turquoise
turquoiseblue	violet	violetred	warmgrey	wheat	
whitesmoke	yellow				

huge amount of work is waiting to be done, e.g. increasing its efficiency and making it more compatible with Tex/Latex. If you have any comment that are helpful to this course, please don't hesitate to contact me. I hope my effort is helpful to you and thank you for your attention.

