

KeTCindy/KeTCindyJS

A Bridge between Teachers and Students

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What is KeTCindy?

$\text{KETCindy} = \text{KETpic} + \text{Cinderella2}$

- Teachers who use $\text{T}_{\text{E}}\text{X}$ desire to produce figures inserted to their teaching materials interactively and easily.
- KETCindy is a collaboration of KETpic developed mainly by Takato and Cinderella2 (Cindy), a DGS, to help them.
- KETCindy uses KETpic as $\text{T}_{\text{E}}\text{X}$ code generator and Cindy as GUI.

Cindyscripts and K_{ET}Cindy

- Cindy has programming language CindyScript.
- CindyScripts is a general language so easy to use.
- Moreover, it can handle other than geometric objects, which distinguishes it from other DGS.
- K_{ET}Cindy is a macro package of CindyScript.

How K_ET Cindy works

- K_ET Cindy works as a kind of preprocessor of T_EX graphical code systems(Tpic, pict2e,TikZ).
- It generates graphical data as follows:
 - (1) Write scripts of K_ET Cindy in CindyScripts.
 - (2) Cindy changes the scripts to scripts of R.
 - (3) R generates graphical data(.tex) of T_EX.
- Insert it with T_EX command ”\input”.

How K_ET Cindy works (Example)

- Scripts of K_ET Cindy

```
Ketinit();Plotdata("1","sin(x)","x");Windisp();
```

- Generated graphical data of pict2e for example

```
{\unitlength=1cm%
\begin{picture}(12,4)(-6,-2)%
\linethickness{0.008in}%%
\polyline(-6.00000,0.27942)(-5.76000,0.49964)(-5.52000,0.69123)...
\polyline(-6.00000,0.00000)(6.00000,0.00000)%
...
\put(-0.0500000,-0.0500000){\hspace*{\Width}\raisebox{\Height}{0}}%
\end{picture}}%
```

Demo

Website of K_{ET}Cindy

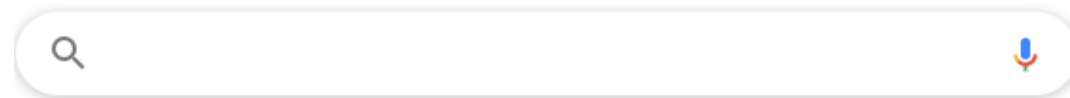
- We have launched a website for K_{ET}Cindy.
<https://s-takato.github.io/ketcindy>
- Search the site with keywords **ketcindy samples**.
- You can find many samples of K_{ET}Cindy there.
- References of K_{ET}Cindy are also downloadable.

How to install K_ET Cindy

- CTAN(Comprehensive T_EX Archive Network) has uploaded K_ET Cindy to the site in 2018.

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🔍 ctan ketcindy

- Then you can download the package of K_ET Cindy directly from **ctan ketcindy**.

Repository page

- You can download the latest version of K_ET Cindy from [Repository](#)
- Follow 'readme' in the folder 'ketcindy(-master)'.
[ReadmeWin](#)
[ReadmeMac](#)

Necessary softwares for K_ET Cindy

- Cinderella2

- R

- Maxima

- A T_EX system

TeXLive may be easy to install K_ET Cindy.

- PDF viewer

For windows, Sumatra is recommended.

Examples of K_ET Cindy

- **s01** 01figure, 06bowhatch
- **s02** 01figure, 06bowhatch, 10diffeq2
- **s04** 01basic, 02ospline
- **s05** 02spacecurve, 07polyhedron
- **s09** 03saddle, 08wiredata
- **s10** 02tangentialline

KeTCindyJS

CindyJS

- A group of Technical University of Munich has been developing CindyJS <https://cindyjs.org>.

CindyJS is a framework to create interactive (mathematical) content for the web. It aims to be compatible with Cinderella, providing an interpreter for the scripting language CindyScript as well as a set of geometric operations which can be used to describe constructions.

- CindyJS itself doesn't support KETCindy , so it is not enough to produce many kind of teaching materials.

Deveolpment of K_{ET}CindyJS

- Cinderella2 can export codes in CindyScripts and components in CindyScreen to a HTML file.
- We have developed K_{ET}CindyJS which make it possible to use many functions of K_{ET}Cindy in the HTML file.
- You can find lots of samples at page [samples of ketcindy](#).
- Here, some simple examples will be demonstrated.

How K_{ET}CindyJS produces HTML

s02graphs

Samples of KeTCindyJS

Simple examples

- Tangent of Sine
- Implicit Function
- 2nd-order Deq
- Rotate Triangle

Animations

- Deqplot
- General Angle
- Hypotrochoid

Inputbox

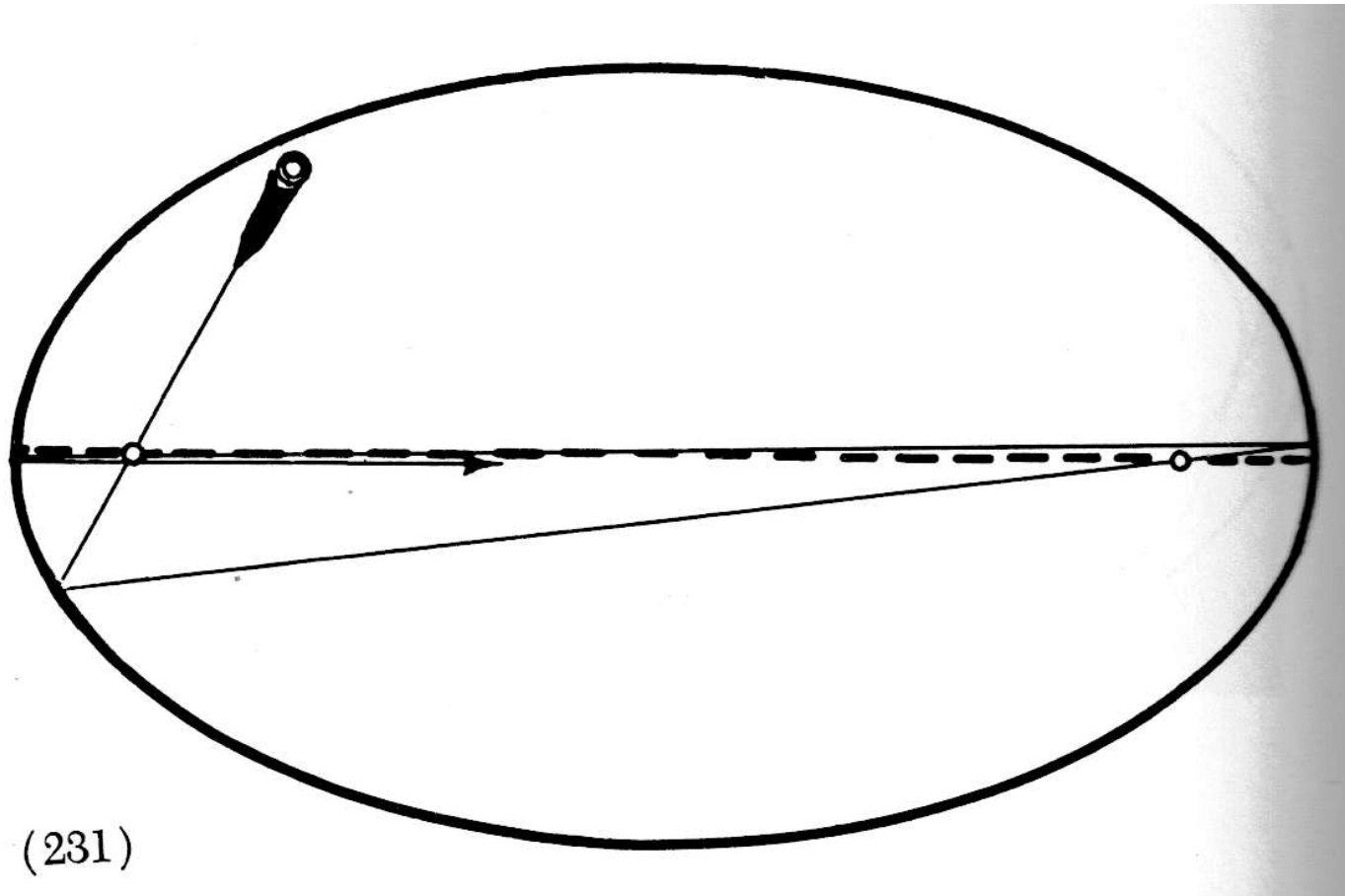
- Trigonometric
- Napier's Constant
- Calc of sin,cos,tan

Advanced Samples

- Rotataion of Cube
- Graph of $\sin(x)$

Using Maxima

Elliptical Billiard



Elliptical Billiard

Hugo Steinhaus

MATHEMATICAL SNAPSHOTS

Originally copyrighted by Oxford University Press, Inc.
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s0612

Fourier Series

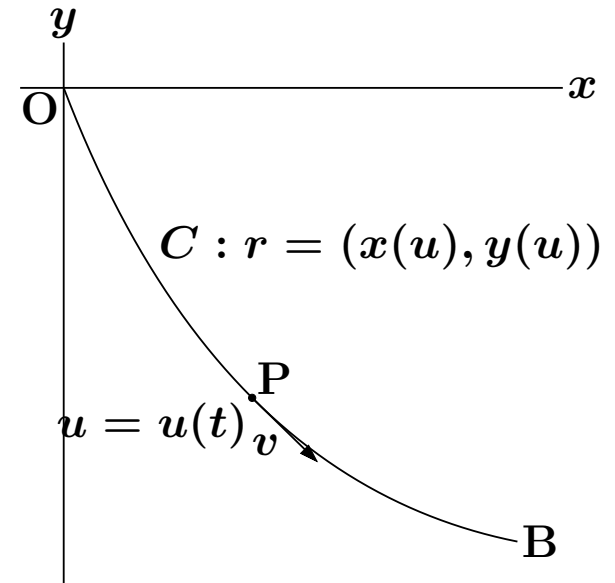
- Vallejo-san has developed a package to find Fourier coefficients of piece-wise functions.
- **s1010**

Brachistchrone Curve

- $\frac{du}{dt} = \sqrt{\frac{-2gy}{\dot{x}^2 + \dot{y}^2}}, \quad u(0) = 0$

- $T = \int_0^U \sqrt{\frac{\dot{x}^2 + \dot{y}^2}{-2gy}} du$

- s1611

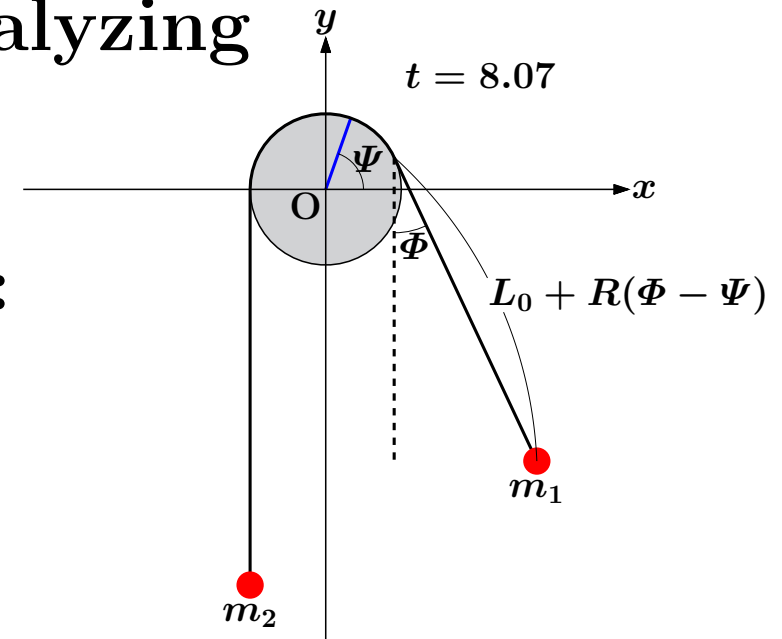


Swinging Atwood's Machine

- Prokopenya-san has been analyzing various Atwood's machines.

- He obtained the Lagrangean:

$$\begin{aligned}\mathcal{L} = & \frac{1}{2}m_1(L_0 + R(\Phi - \Psi))^2\dot{\Phi}^2 \\ & + \frac{1}{2}(I_0 + (m_1 + m_2)R^2)\dot{\Psi}^2 \\ & - m_1g(R\sin\Phi - (L_0 + R(\Phi - \Psi))\cos\Phi) \\ & + m_2gR\Psi\end{aligned}$$



- From this,
$$\ddot{\Psi} = \frac{R(g(m_2 - \cos\Phi m_1) - \dot{\Phi}^2((\Phi - \Psi)R + L_0)m_1)}{R^2(m_2 + m_1) + I_0}$$
$$\ddot{\Phi} = \frac{-\sin\Phi g + 2\dot{\Phi}\dot{\Psi}R - \dot{\Phi}^2 R}{(\Phi - \Psi)R + L_0}$$

Conclusions

K_{ET}CindyJS for education

- K_{ET}CindyJS has great potential to produce more interactive materials.
- As a result, it will accelerate communication between teacher(s) and students in the classes.
- For now, K_{ET}CindyJS can not call a CAS, which is a future work for us.