Utilization of Algebrite in KeTLTS

Yasuyuki Kubo

Yuge KOSEN

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Outline of Today's Talk

What is Algebrite

- Algebrite is a library for CAS. It can run in the html.
- Prof. Kitamoto made a command 'exealg', which allows Algebrite and KeTCindyJS to collaborate.
- We use 'exealg' in KeTTask (which is based on KeTCindyJS).

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$$\boxed{\text{Teacher}} \xrightarrow{easy} \boxed{\text{Student}}$$

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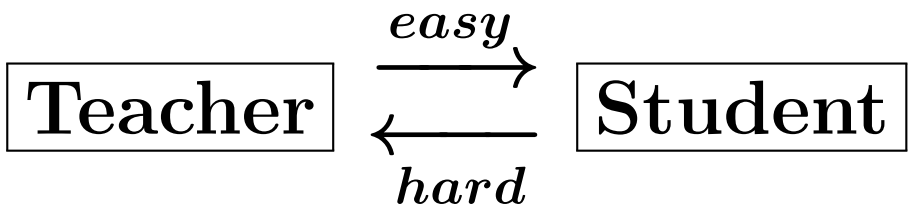

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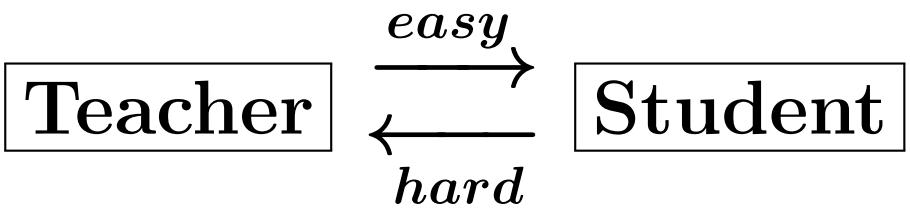

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KeTCindy Learning data Transfer System

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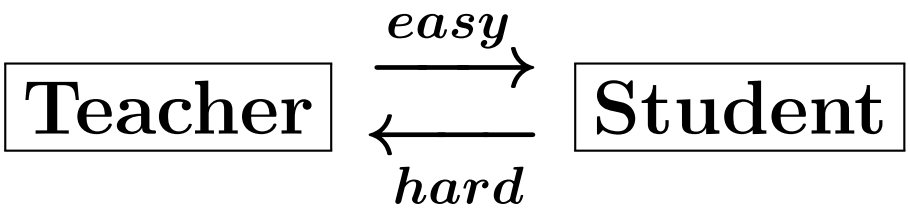

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  - * It is lightweight and easy to process.
- The followings are required
  - (1) Conversion Rules (KeTMath Rules)
  - (2) Function to convert a text to TEX format
  - * CindyJS implements KaTeX (v0.8).
    It displays expressions as 2D in HTML.

KeTMath

- KeTMath Rules

  Here are some typical examples.

  fr(a,b) $\Longrightarrow \frac{a}{b}$

  sq(n,a) $\Longrightarrow \sqrt[n]{a}$

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- Conversion Functions

  Totexform,Tocindyform,Tomaxform

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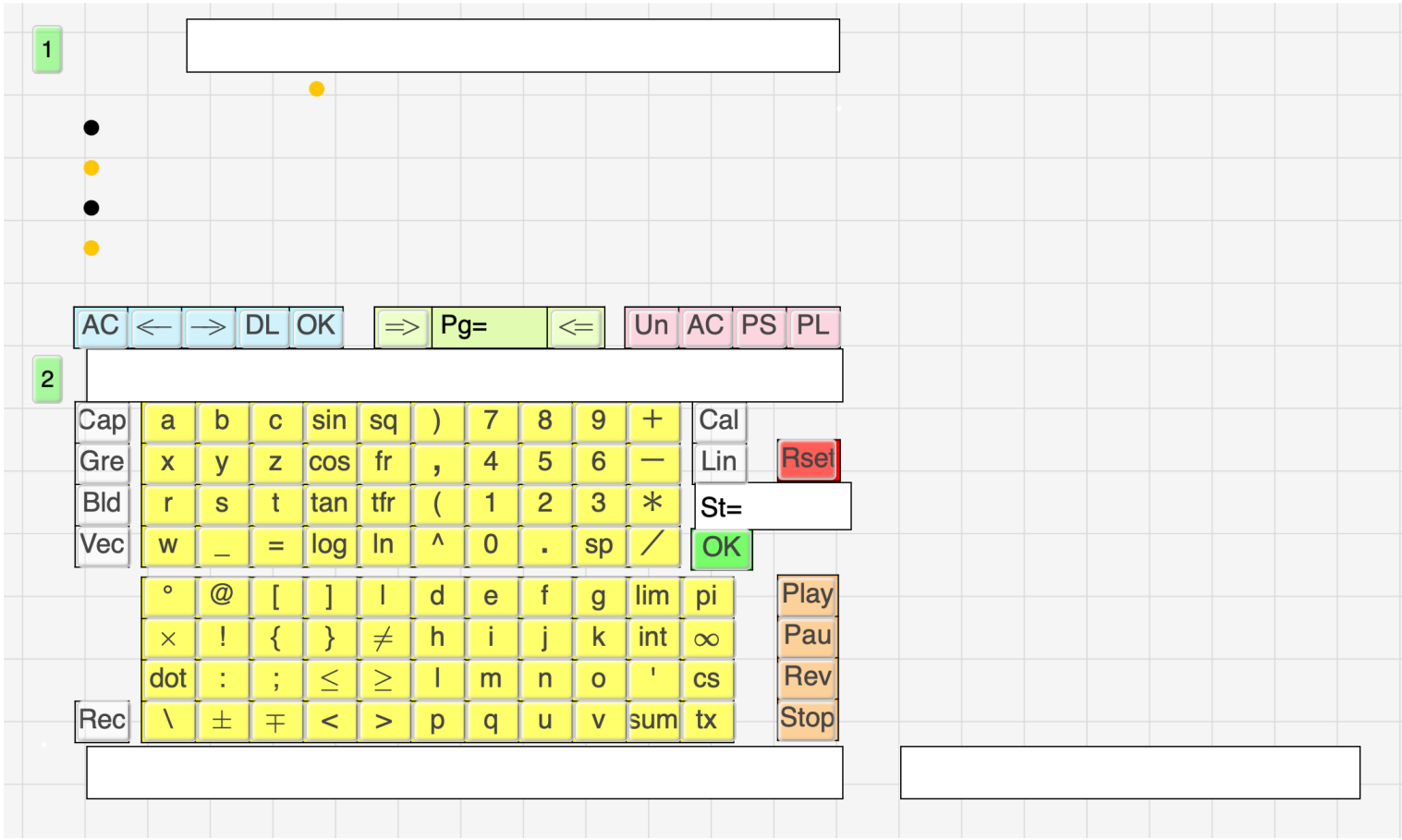
- It exchanges questions and answers written in KeTMath rules.
- 'toolketmath.cdy' creates the html file.

Initial screen of kettask

KeTTask



How to create kettask.html

(1) Goto 'ketcindy home'.

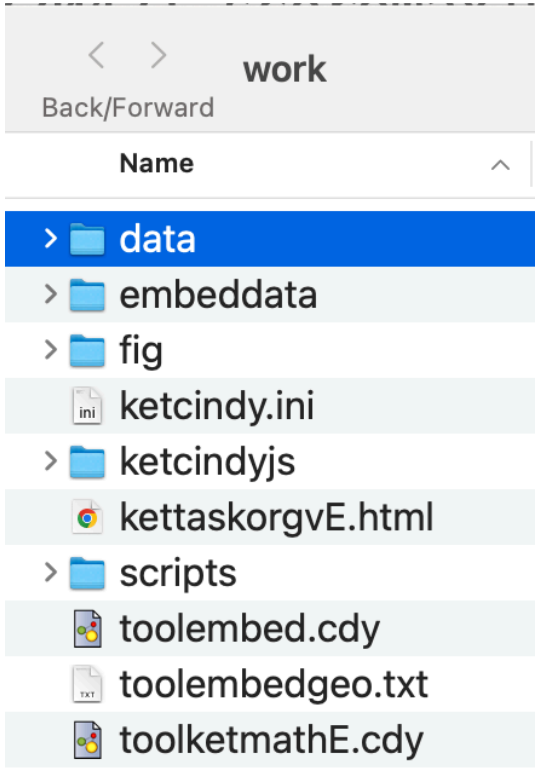
https://s-takato.github.io/ketcindyorg/indexe.html

(2) Install Cinderella.

(3) Download KeTLTS.

I use the bare minimum of files in 'work'.

(4) I will explain the rest by actually running it.



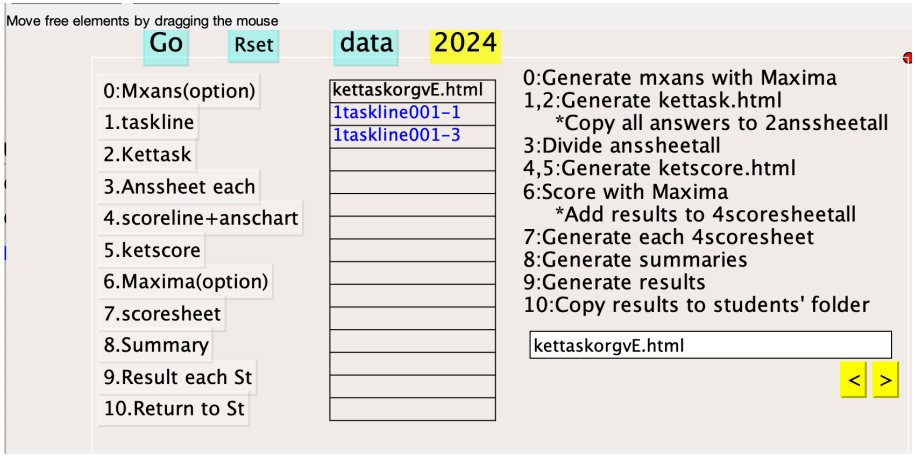
How to create questions

- Go to ‘work/data’
- Open ’student2025.txt’ and register students.
- Open ’question(001-1).txt’ and write questions.

```
Q
Differentiate
[1] y=sin(2x)
[2] y=e^(2x)
Sheet
[1]y'= ::5
[2]y'= ::5
Ans
[1]y'=2cos(2x)
[2]y'=2e^(2x)
```

How to create kettask(xxx).html

- **Launch 'toolketmathE.cdy'**
- **Click '1.taskline' and 'Go'**



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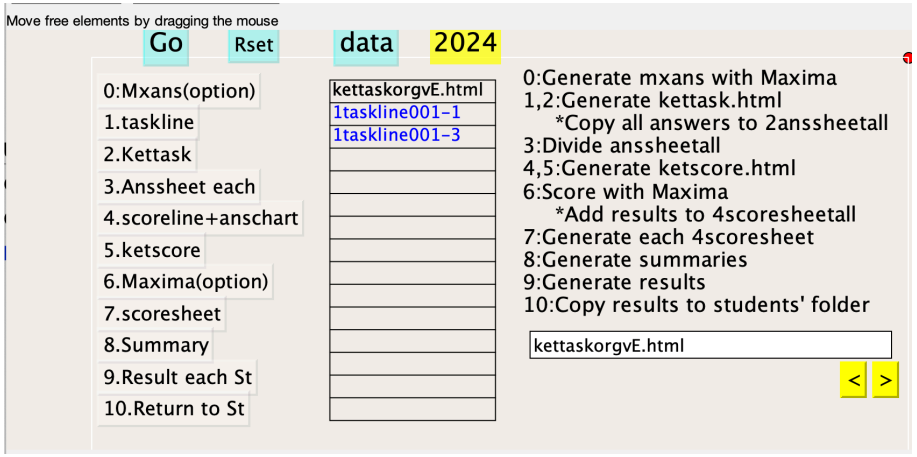
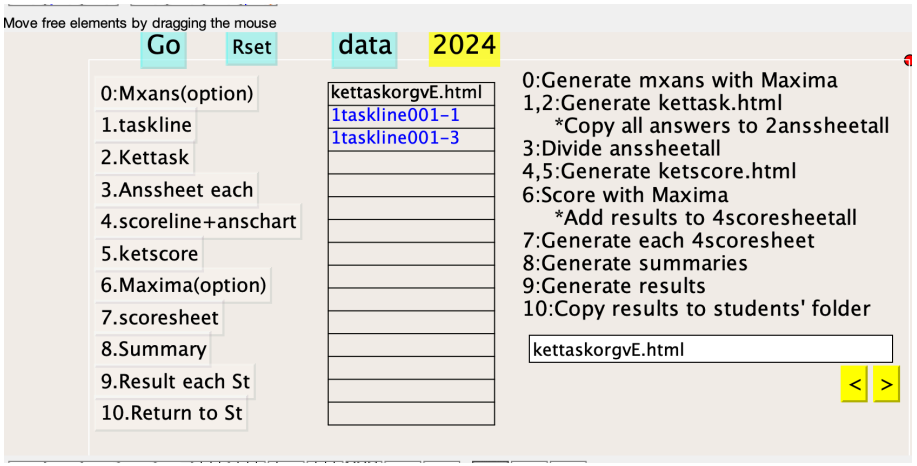


- Click ‘2.Ketask’, select top file and ‘Go’



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- The size of the data to be uploaded is small.
- Teachers can send it at the appropriate time during the class.
- Most students use smartphones and they can immediately receive and start answering questions.

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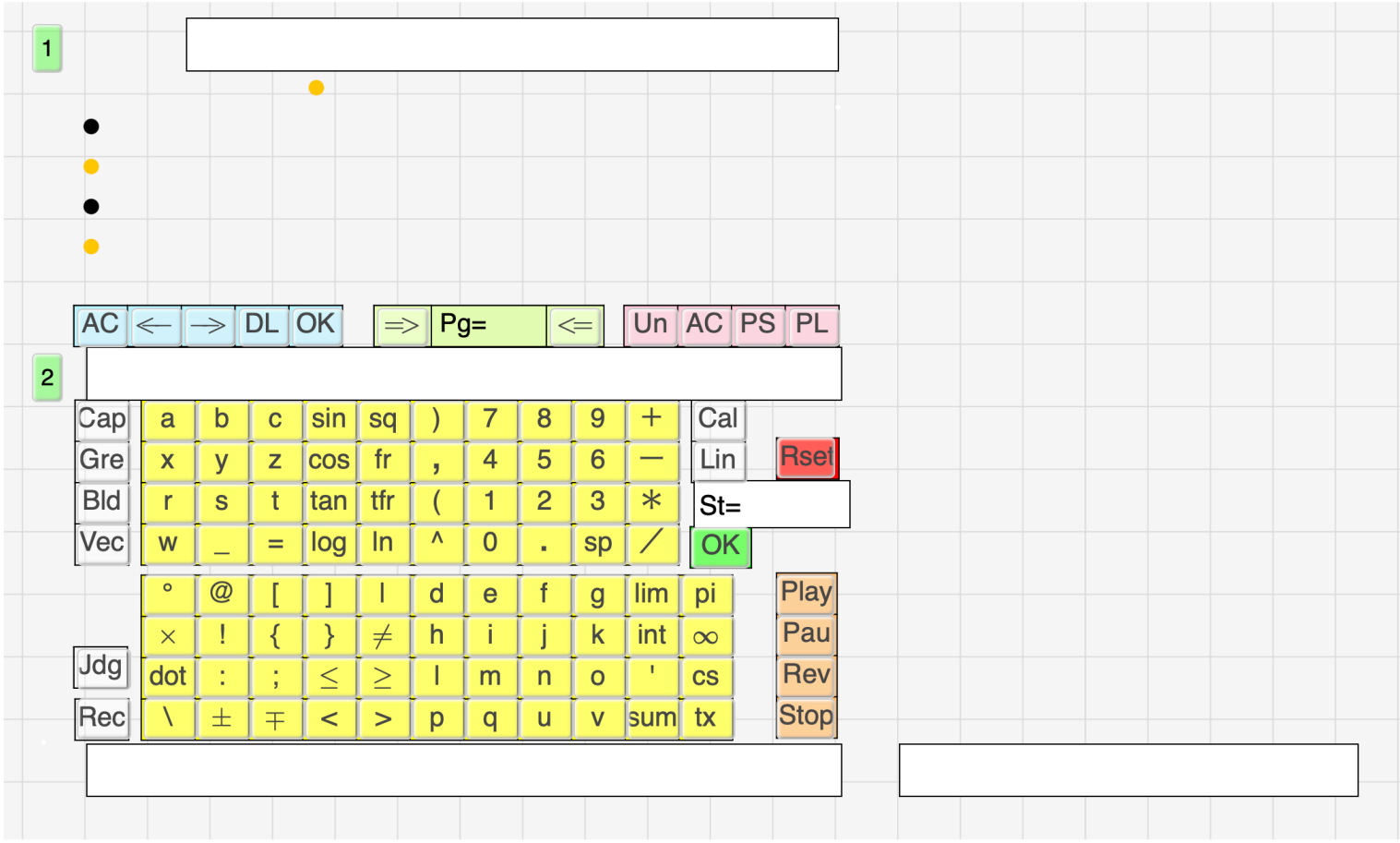
- The result 'anschart.csv' can be easily generated using 'toolketmath.cdy'.

- The point is that 'anschart.csv' is a text file.
  It can be easily processed in various ways.

Bundle of Algebrite

Initial screen of kettask(algbrite version)

KeTTask



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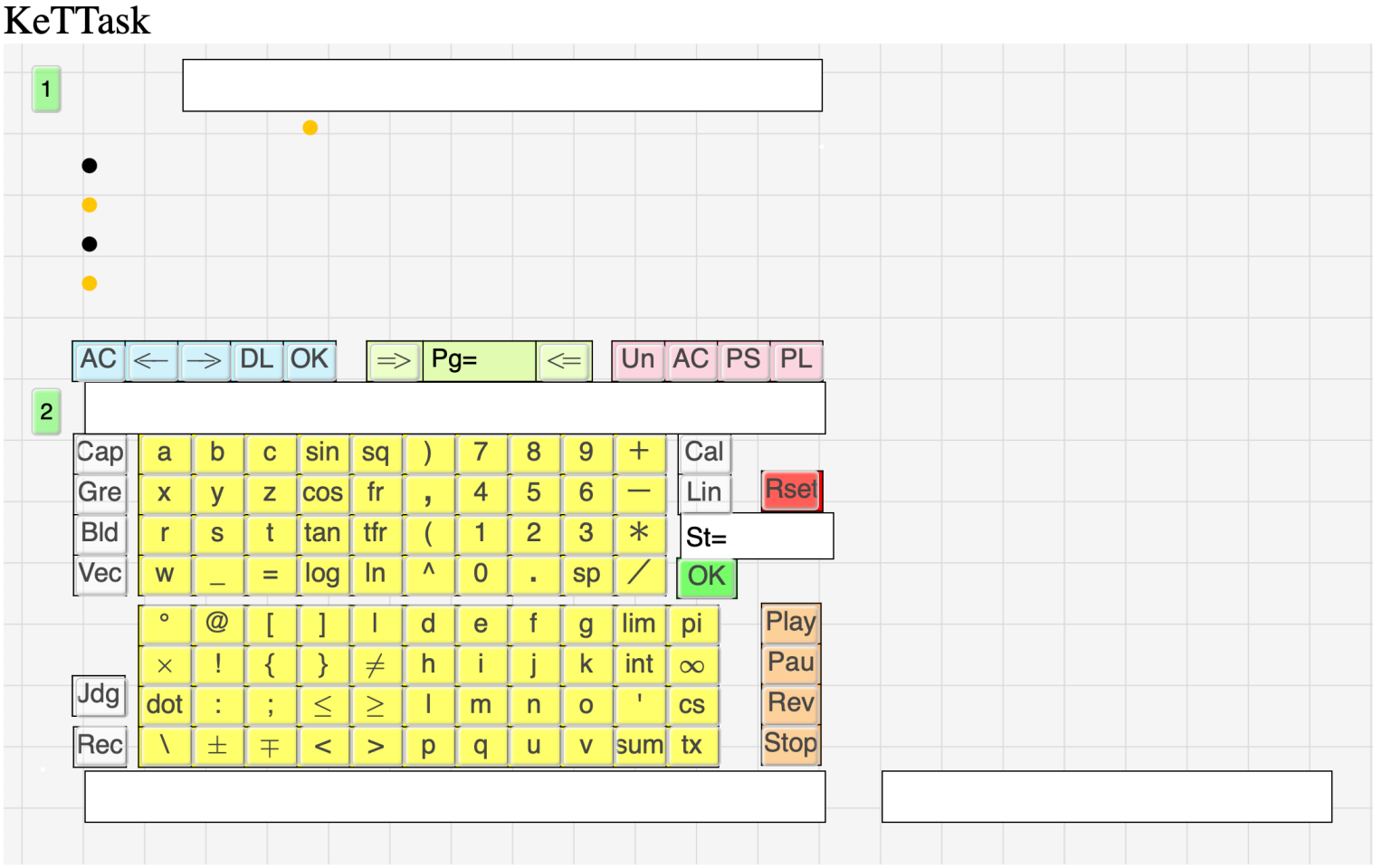

This is algebrite boundle version. (There is the Jdg button)

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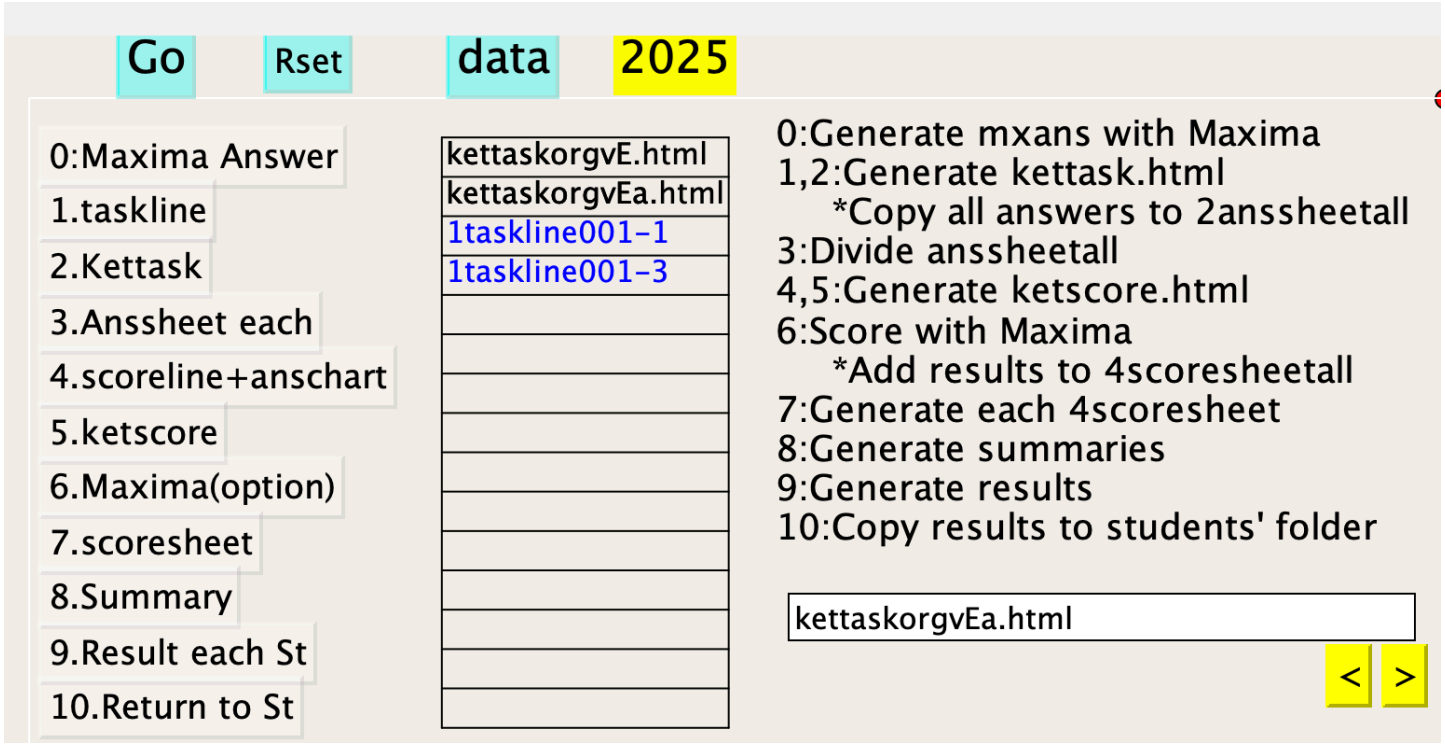
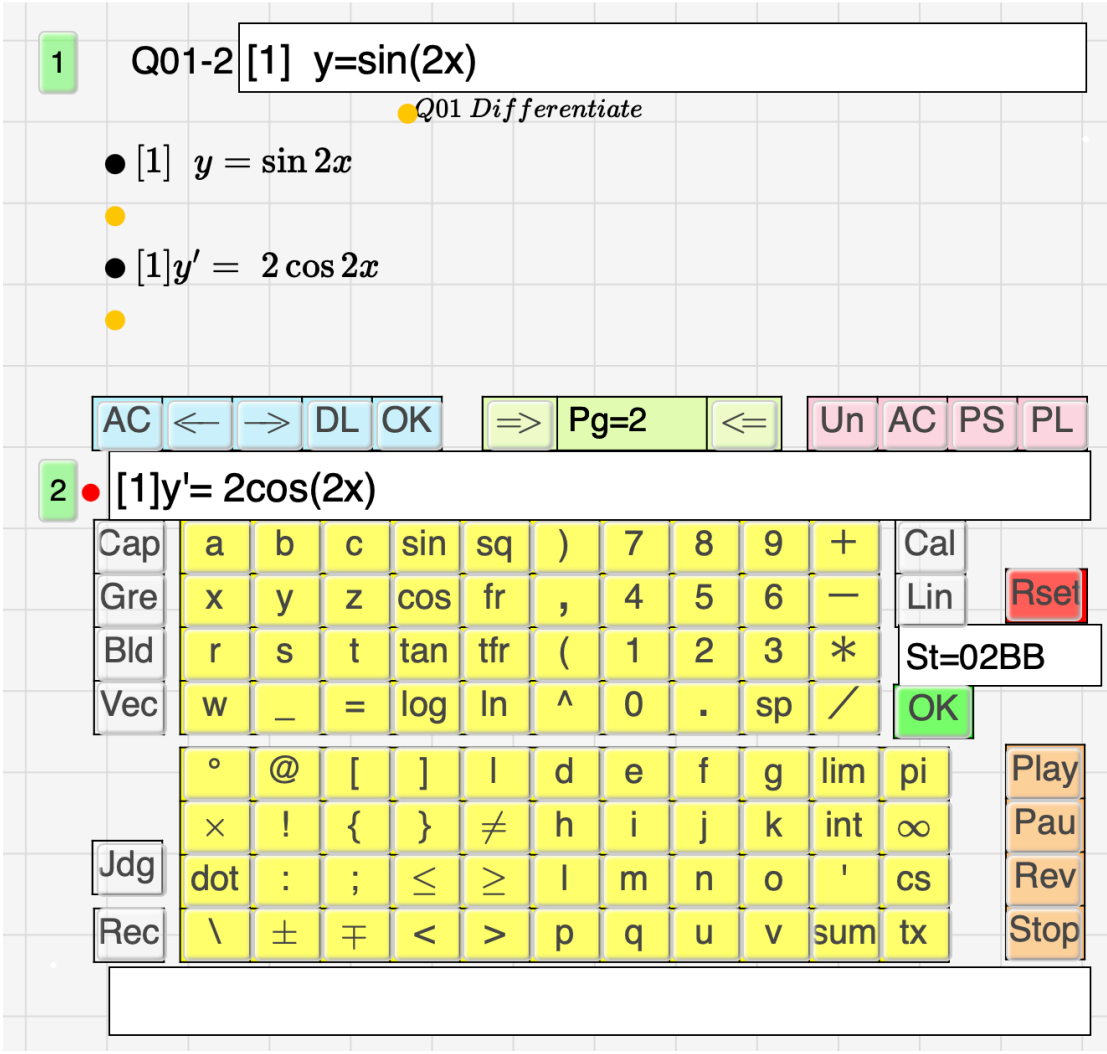
- Launch ‘toolketmathE.cdy’
- Click ‘1.taskline’ and ’Go’
- Click ‘2.Ketask’, select file kettaskorgvEa and ‘Go’



How to use kettaska.html



(1) Initial Screen
(2) St=num, Click OK
(3) Confirm StudentID
(4) Click OK again
(5) Click ⇒
(6) Input 2
(7) Click cos
(8) Input 2x
(9) Click → ('?' moves)
(10) Click OK
'?' disappears

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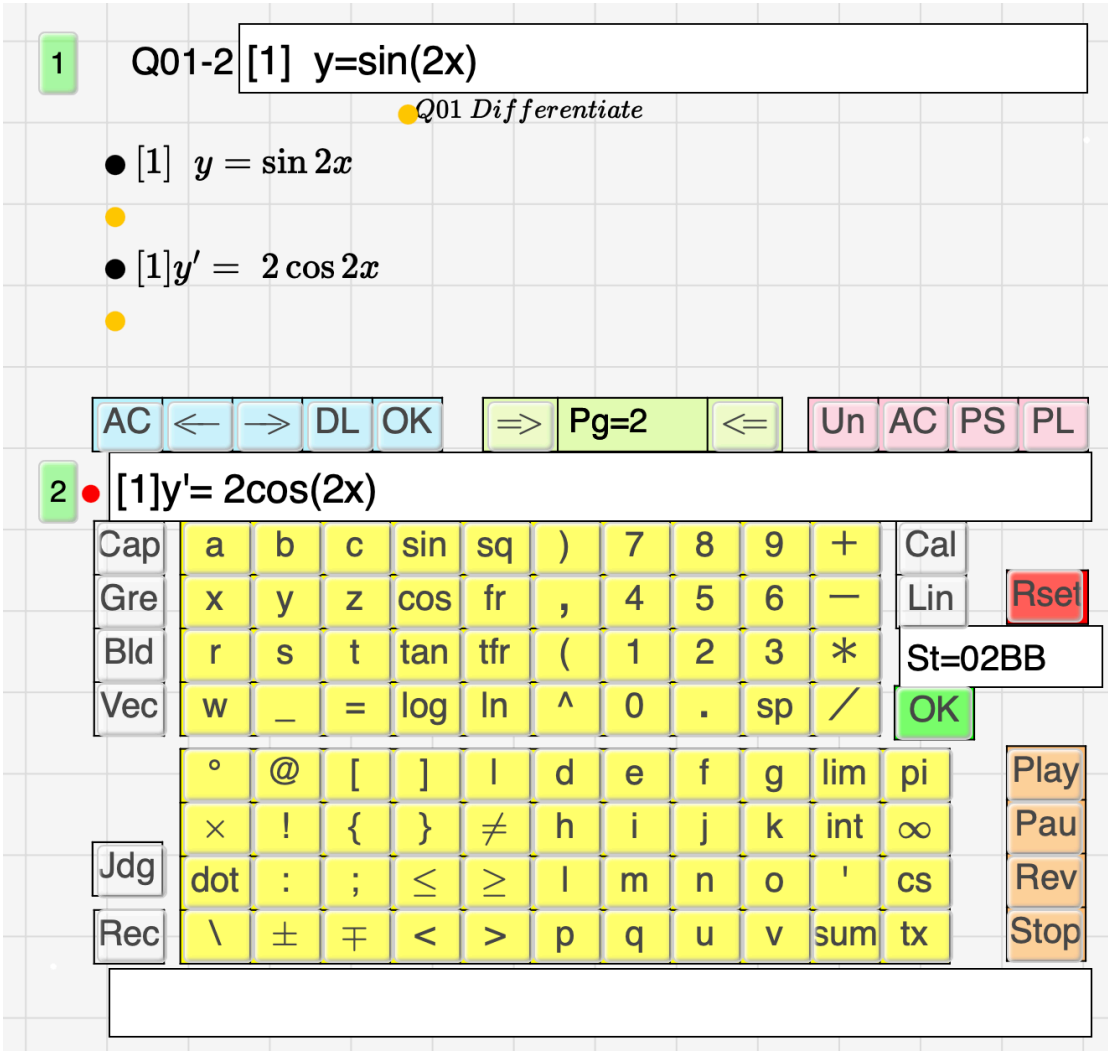

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(11) Click Jdg

[1] 0 ;; [2] error ;; [3] error ;;

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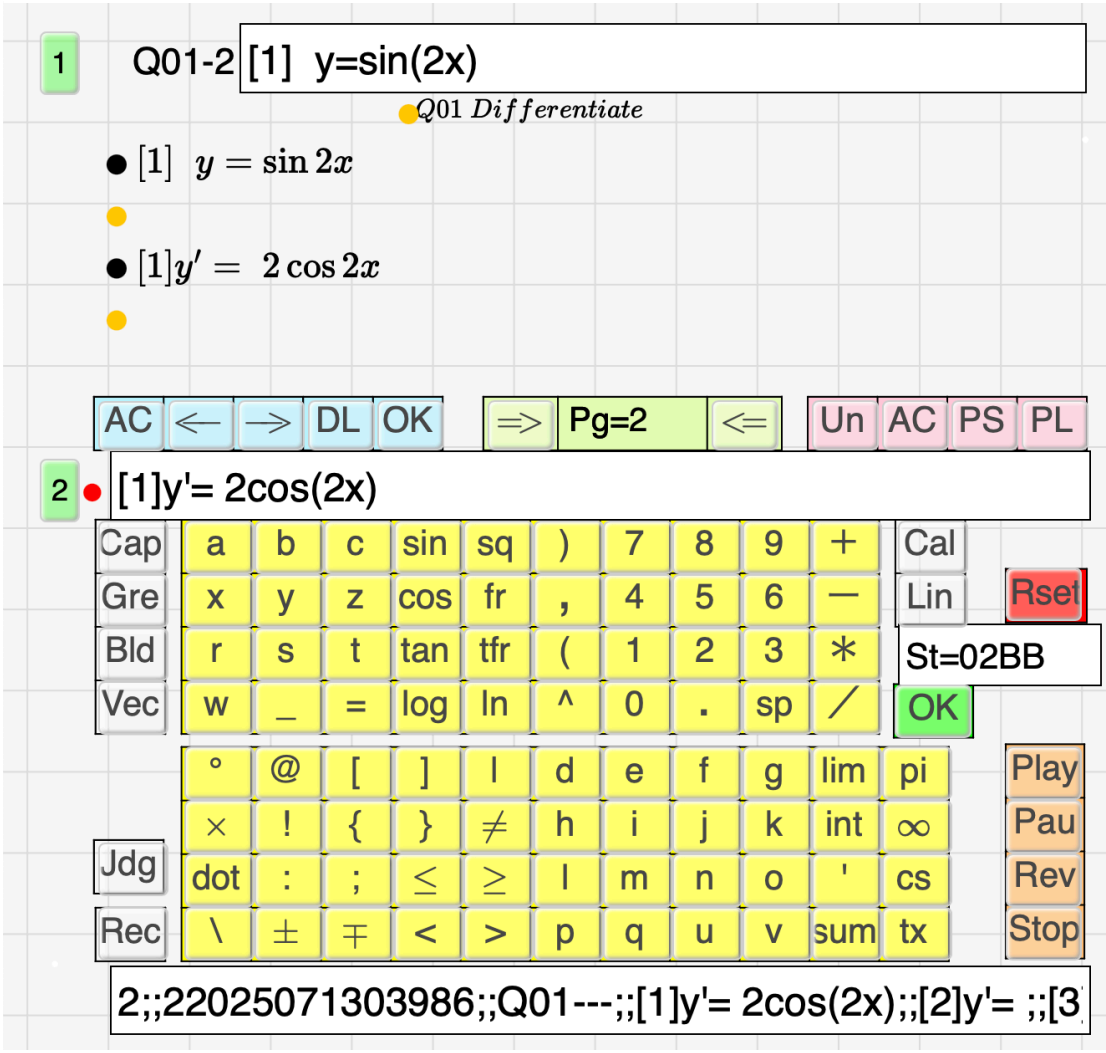

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(12) Click Rec

How to use Algebrite

- **We can use the command 'exealg' in kettaska.html.**
  Example:

```
tmqu1="fr(1,2)x^(2)";// formulas in KetMath rule
tmqu2=Tomaxform(tmqu1);
// Tomaxform change formulas for algebrite
tmqu3="d("+tmqu2+",x)";
// d(f,x) is a function of algebrite
out1 = exealg(tmqu3);
```

then out1 is x^2 that the defferential of tmqu2.

Judge with Algebrite

- We use the command 'exealg' to judge with Algebrite.

  Example:

```
tans3=Tomaxform(tans2);
tmqu3="d("+tmqu2+",x)";
jdgfun=tmqu3+"-("+tans3+")";
jdgout = exealg(jdgfun);
```

- tans2 is the student's answer.
- Instead of inputting the correct answer tmqu3 directly, we let Algebrite compute it.
- '3x^(2)-12' and '3(x^(2)-4)' are mathematically equivalent and correct according to Algebrite.

How to embed Script to Judge

Embed it the same way you would embed a drawn graph.

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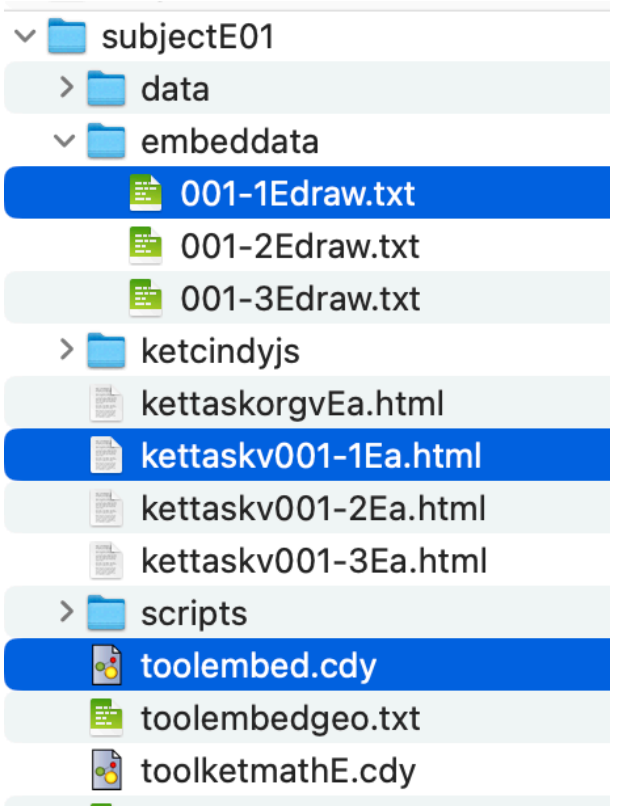

(1) Create a KeTTask file
(kettask001-01Ea.html for example)

(2) Create '01-1draw.txt' in the folder 'embeddata'.

(3) Change the name of the second button from Start to Embed.

(4) Push OK ⇒ Embed.

- I will explain with a sample file.

Conclusion

(1) Students can judge their answers semantically using algebrite.

(2) Improving a judge script with corabora-tion of Algebrite and KeTCindy Script is Future work.

(3) Another future work is to investigate whether semantic self-assessment via the [Jdg] button is educationally effective.

Thank you for your attention

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Σας ευχαριστώ

(サス　エフハリストー)