IS4IS VIENNA (2015)

KETCindy

supporting tool to convert students' findings into knowledge

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Setsuo Takato

KAKENHI 15K01037

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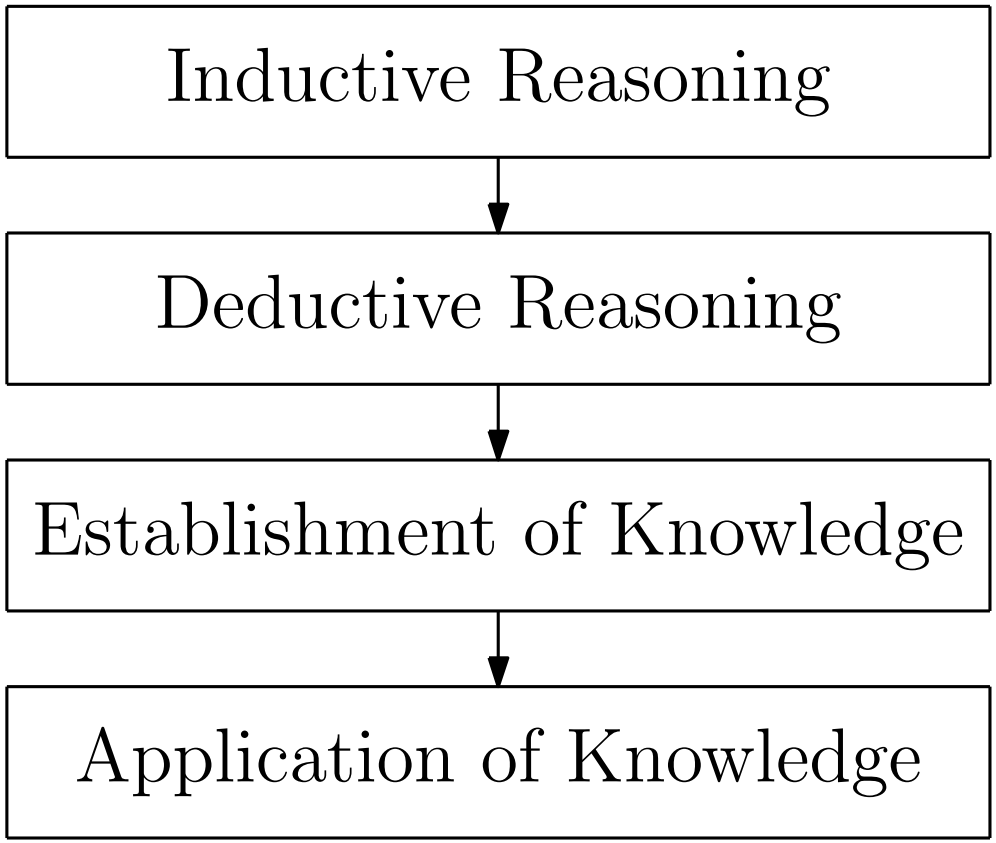
1. Activities in math classroom



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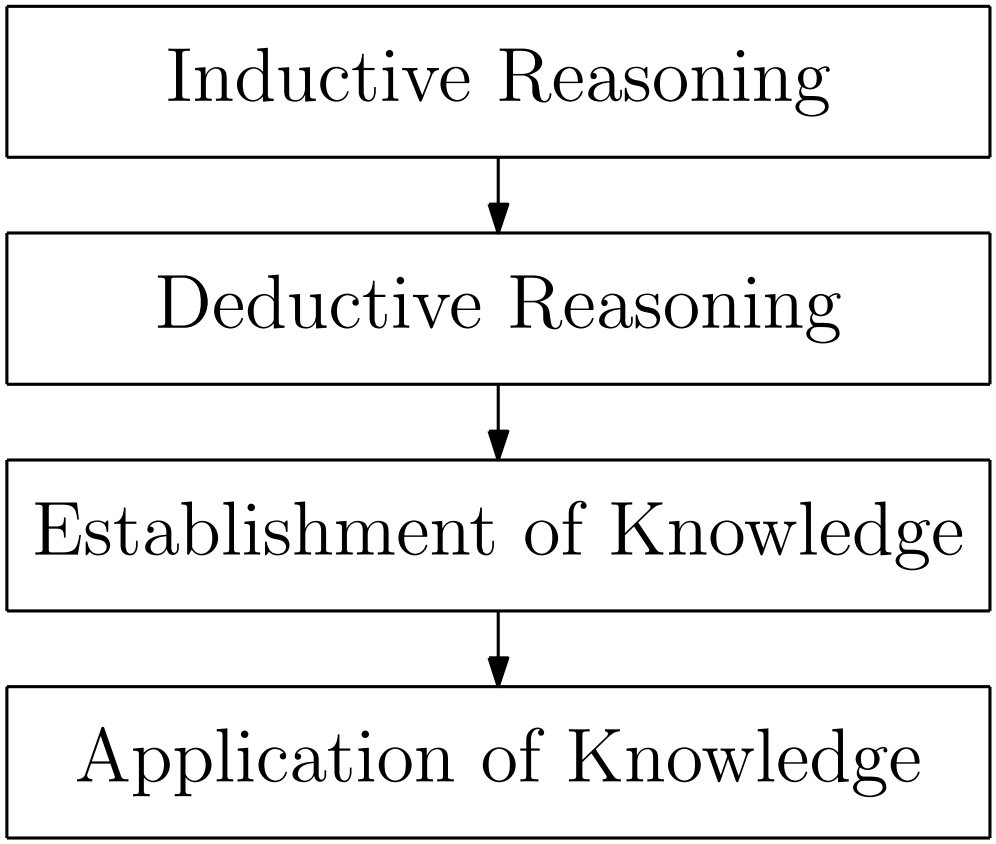
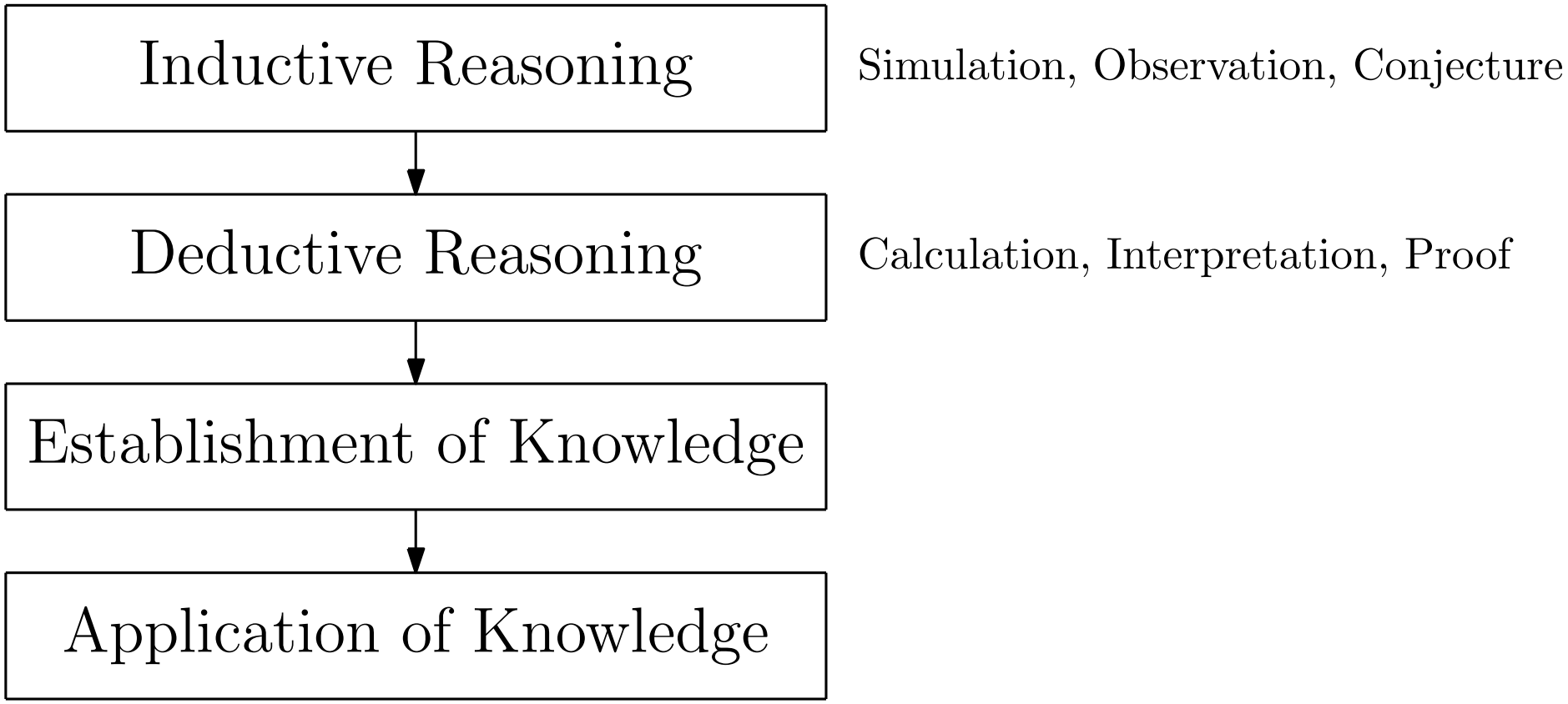


Simulation, Observation, Conjecture

1. Activities in math classroom



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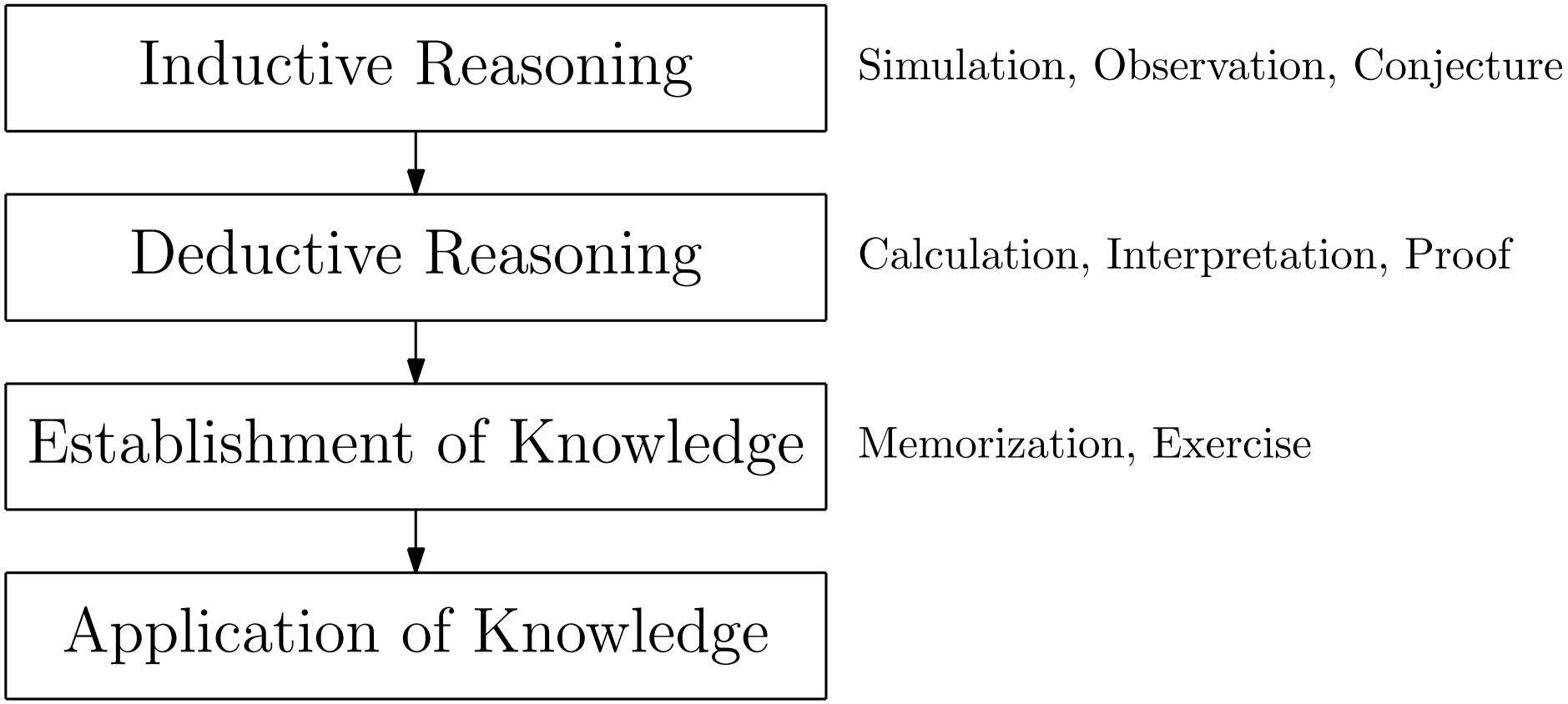
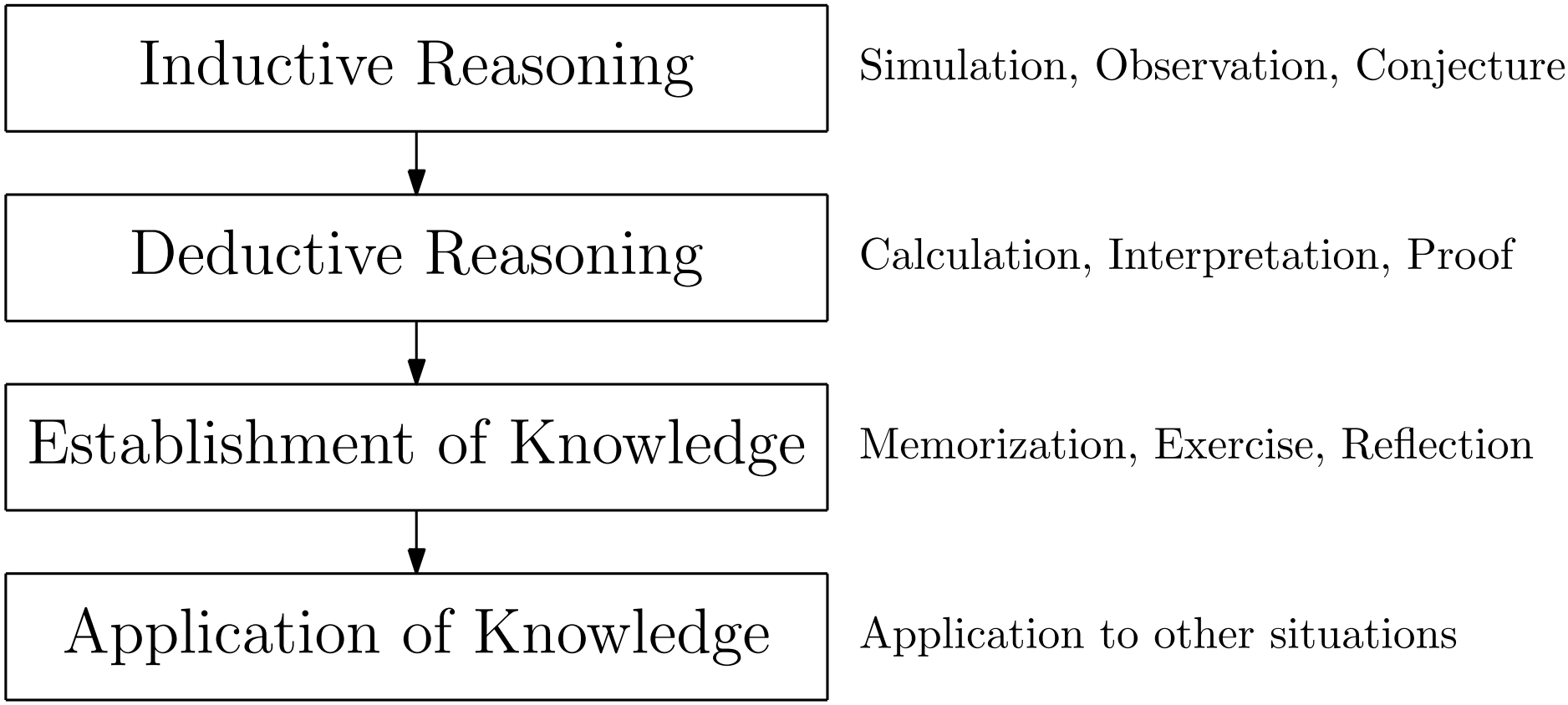
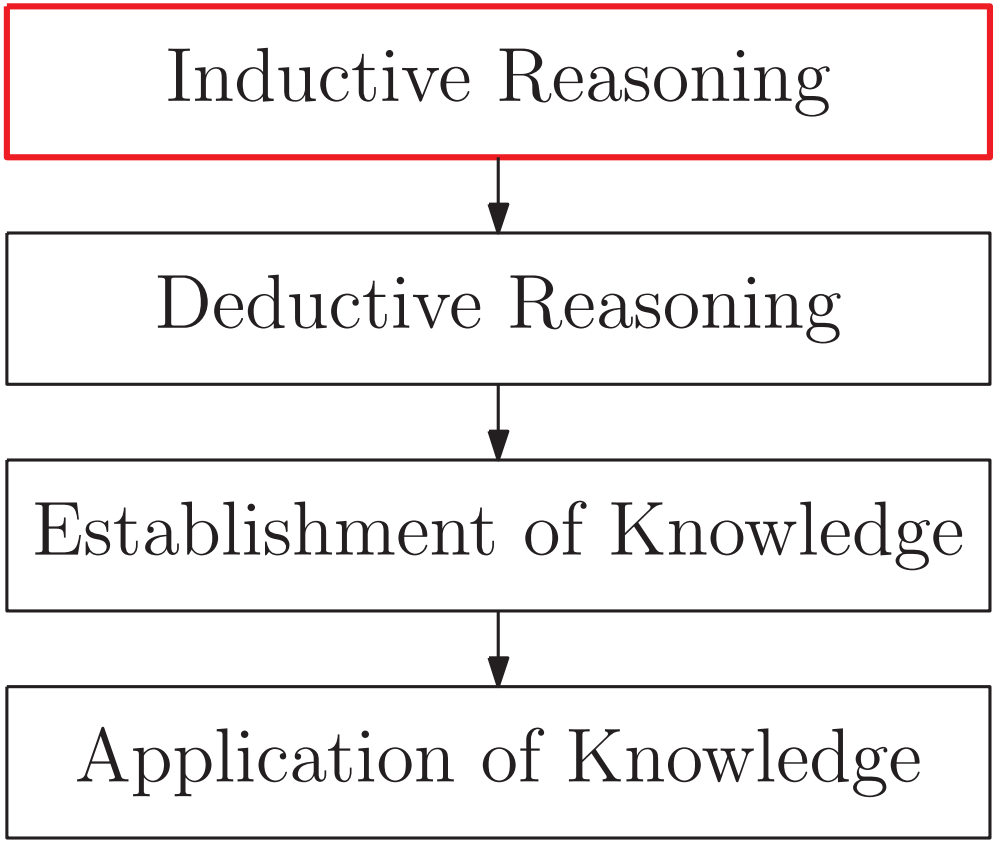


1. Activities in math classroom

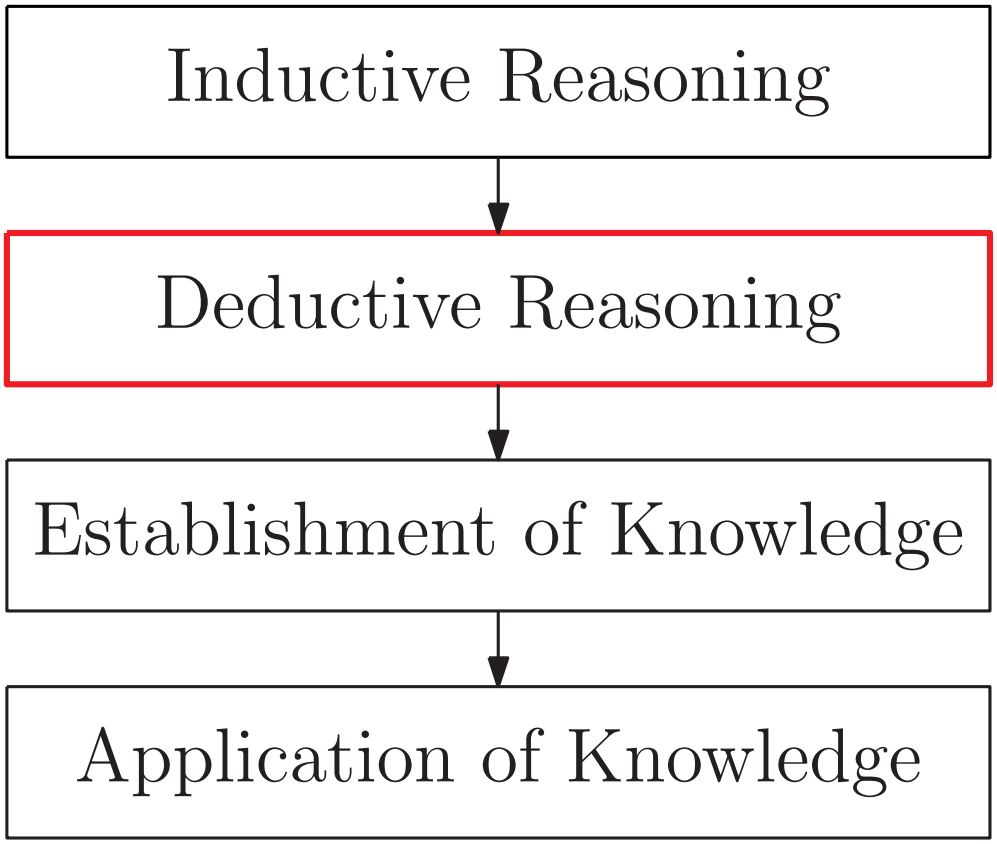


2. ICT support in math classroom



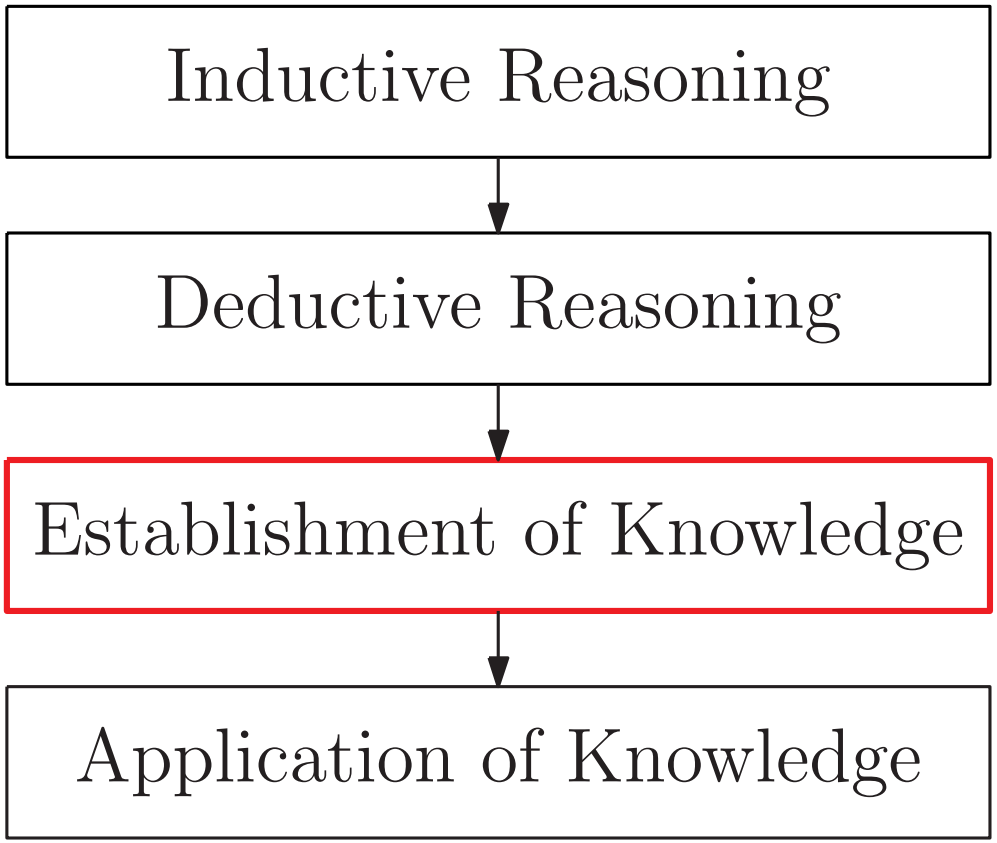
Simulation with CAS/DGS

2. ICT support in math classroom



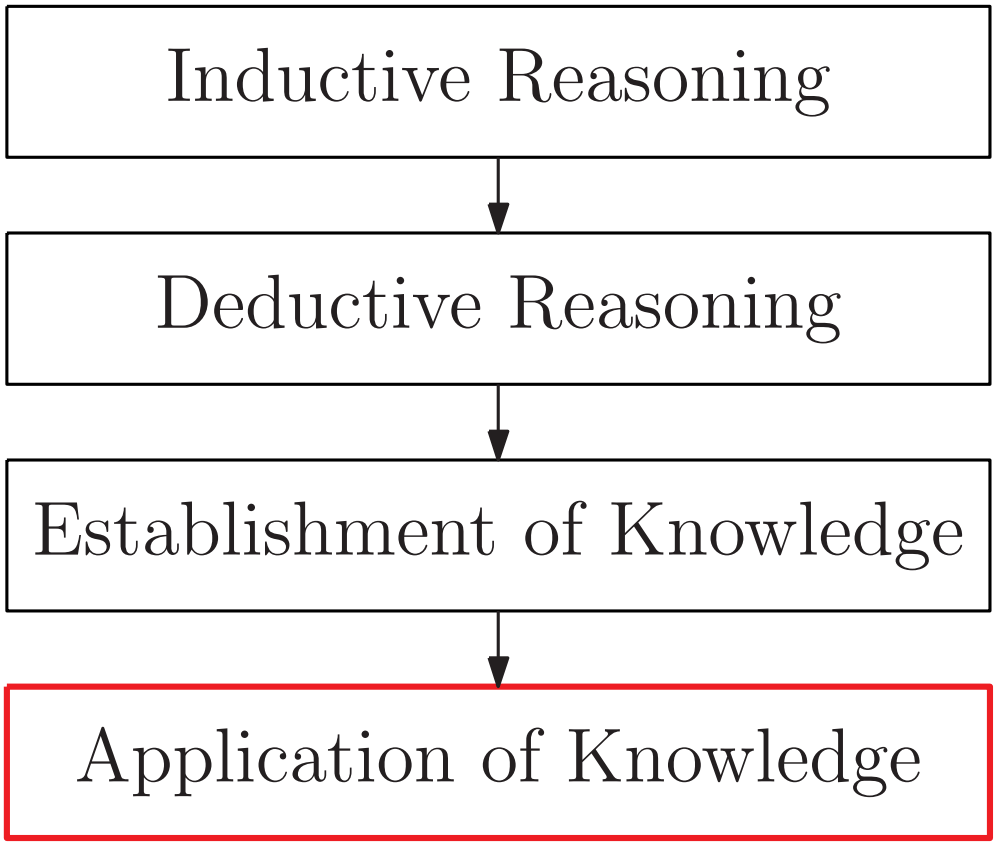
Calculation and Proof
with the aid of CAS/DGS

2. ICT support in math classroom



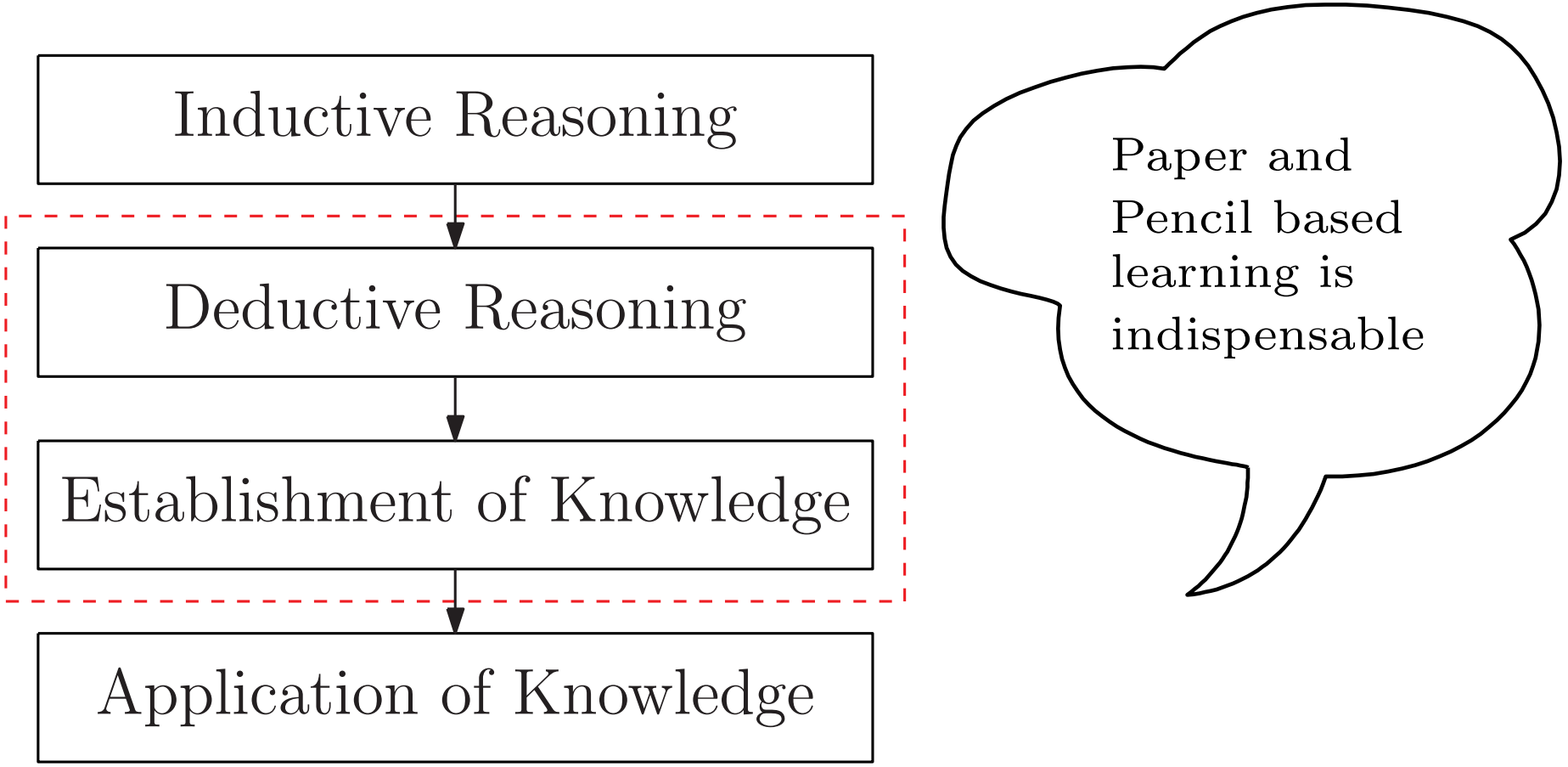
Web based Training

2. ICT support in math classroom



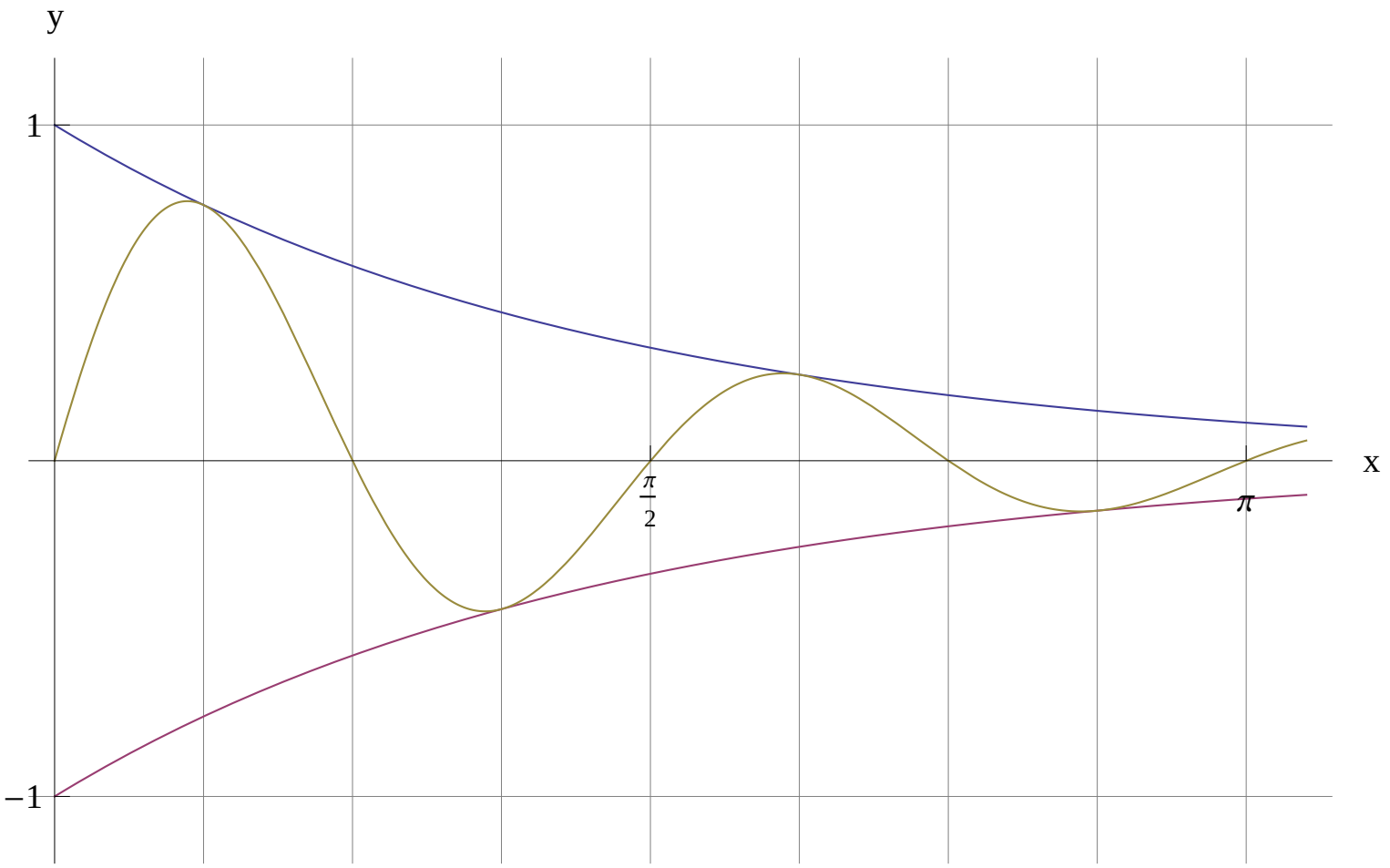
Materials accumulated on the Web

2. ICT support in math classroom



3. Linkage to TEX edition

From CAS to TEX



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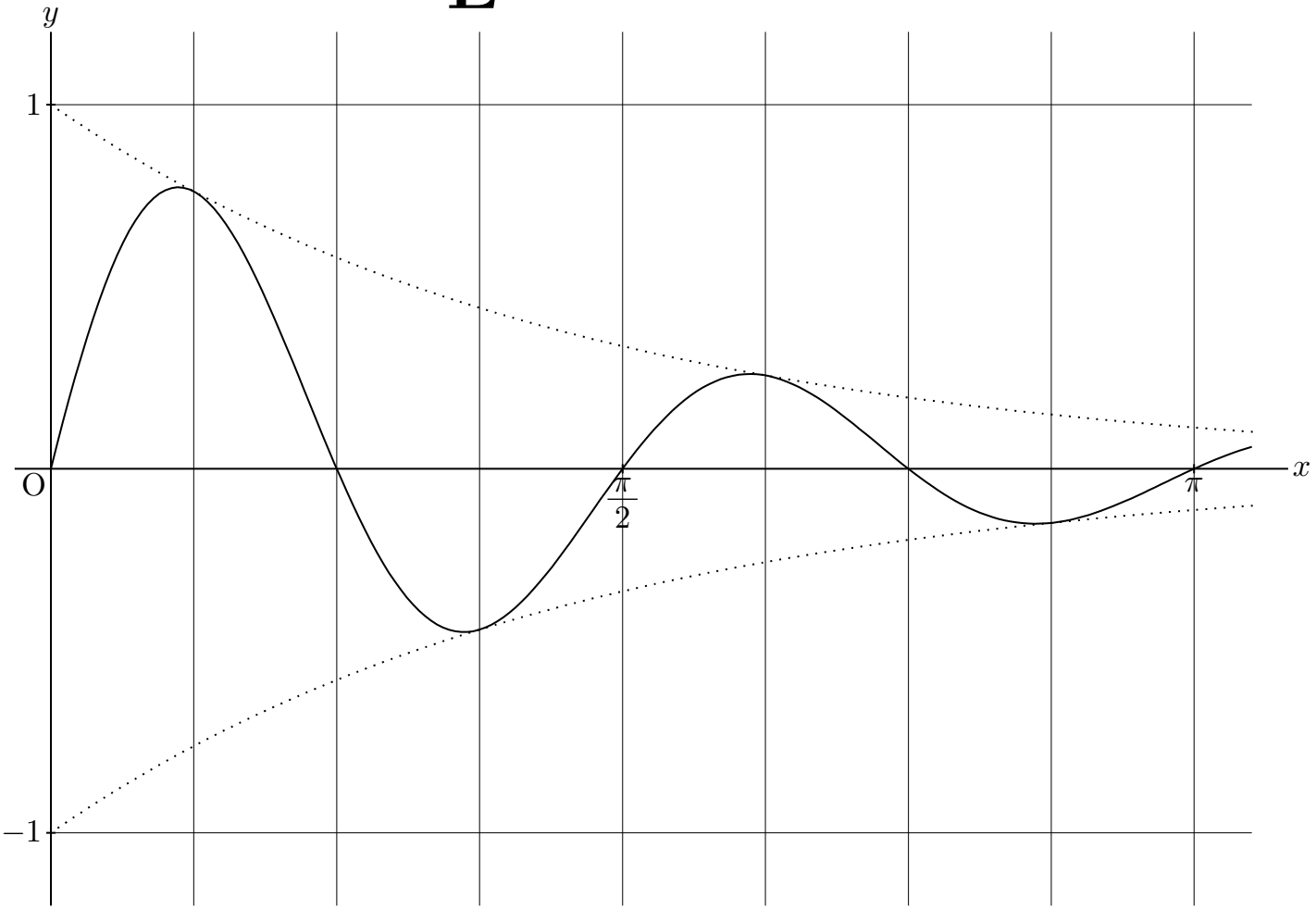
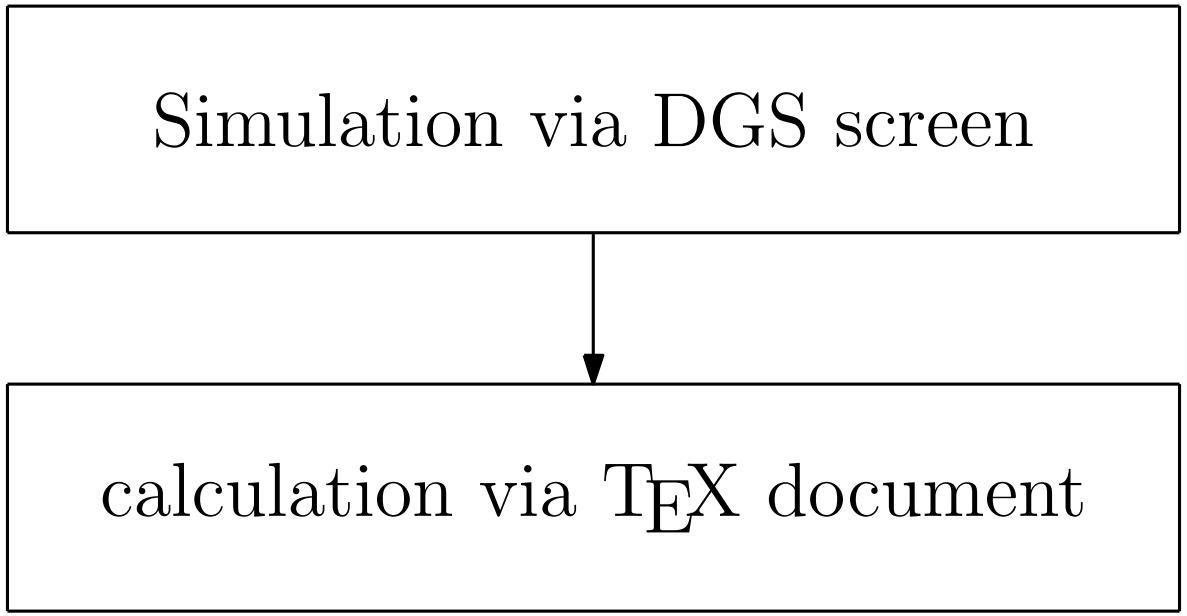


3. Linkage to TEX edition

From DGS to TEX



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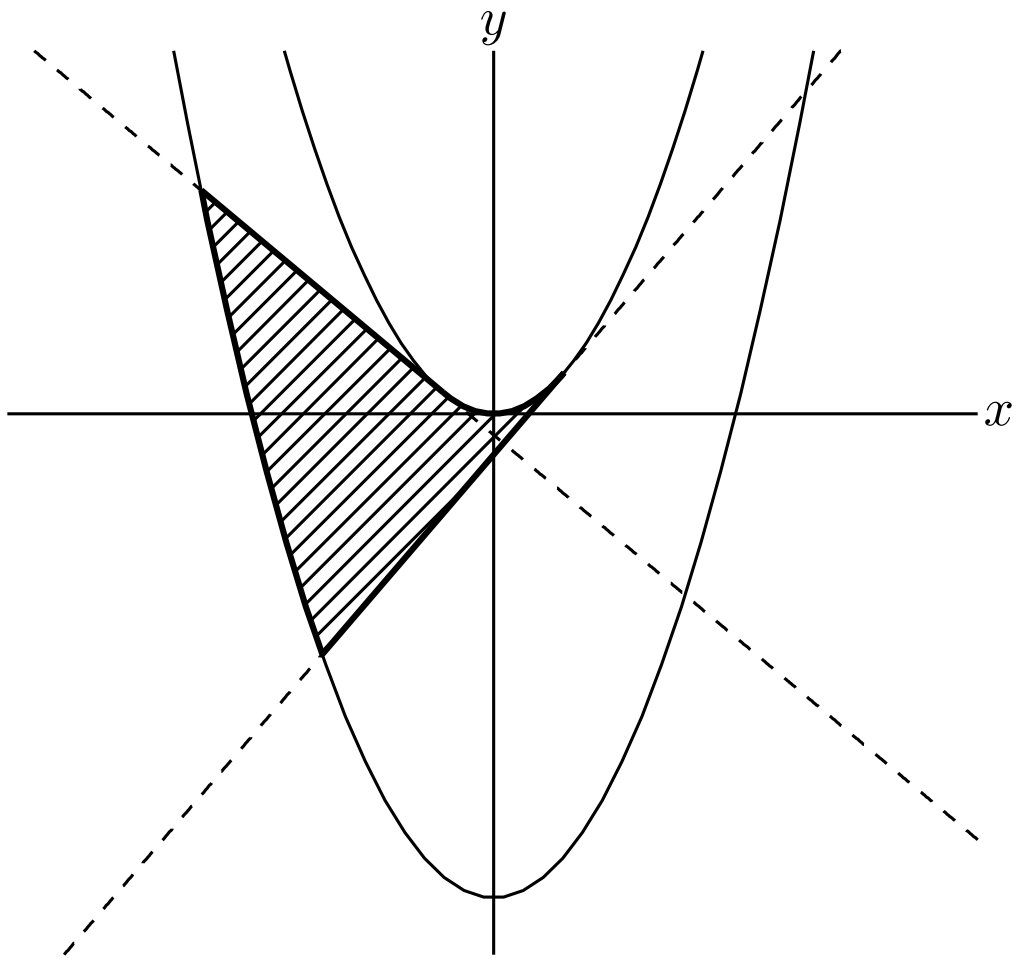

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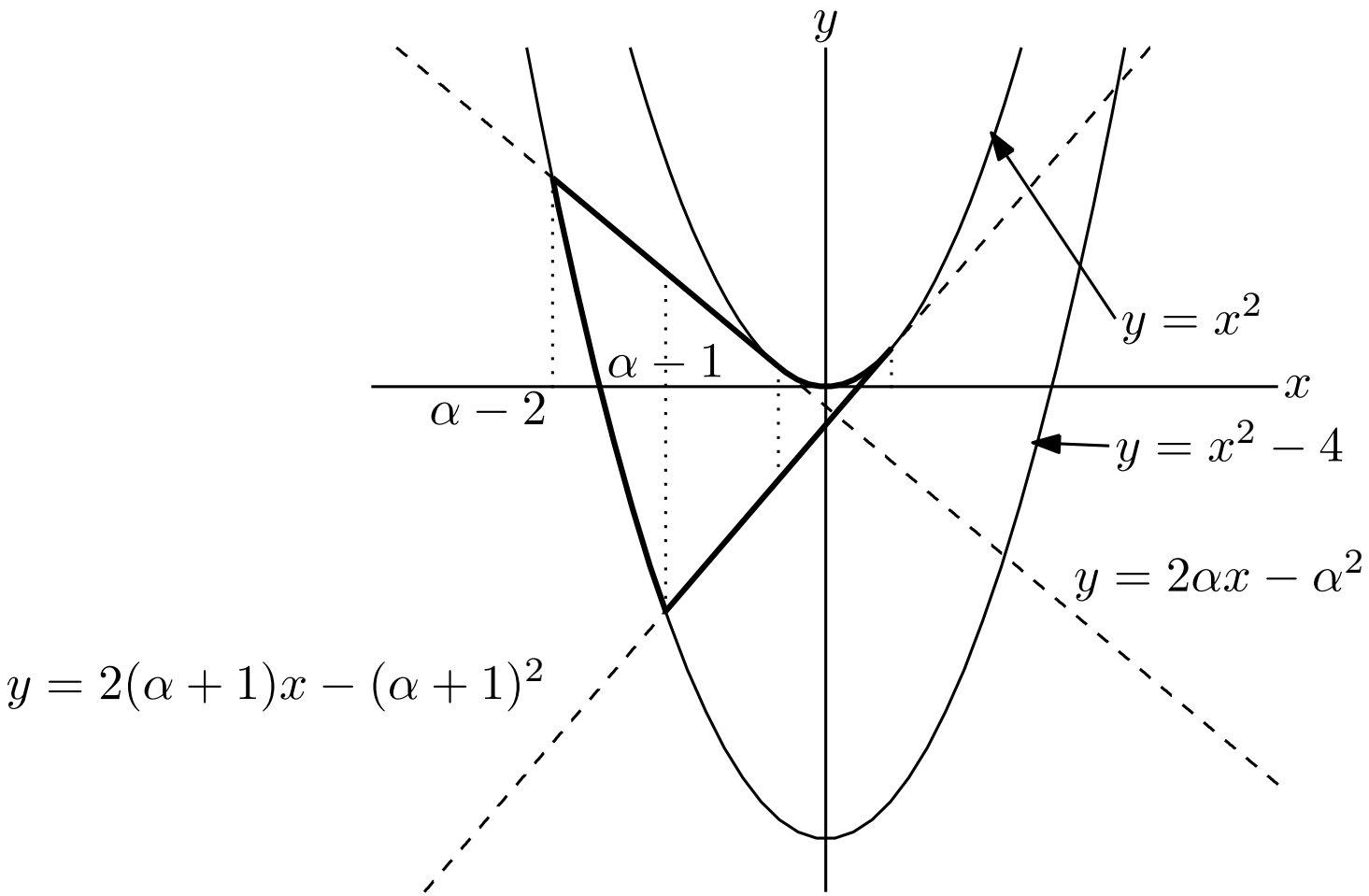

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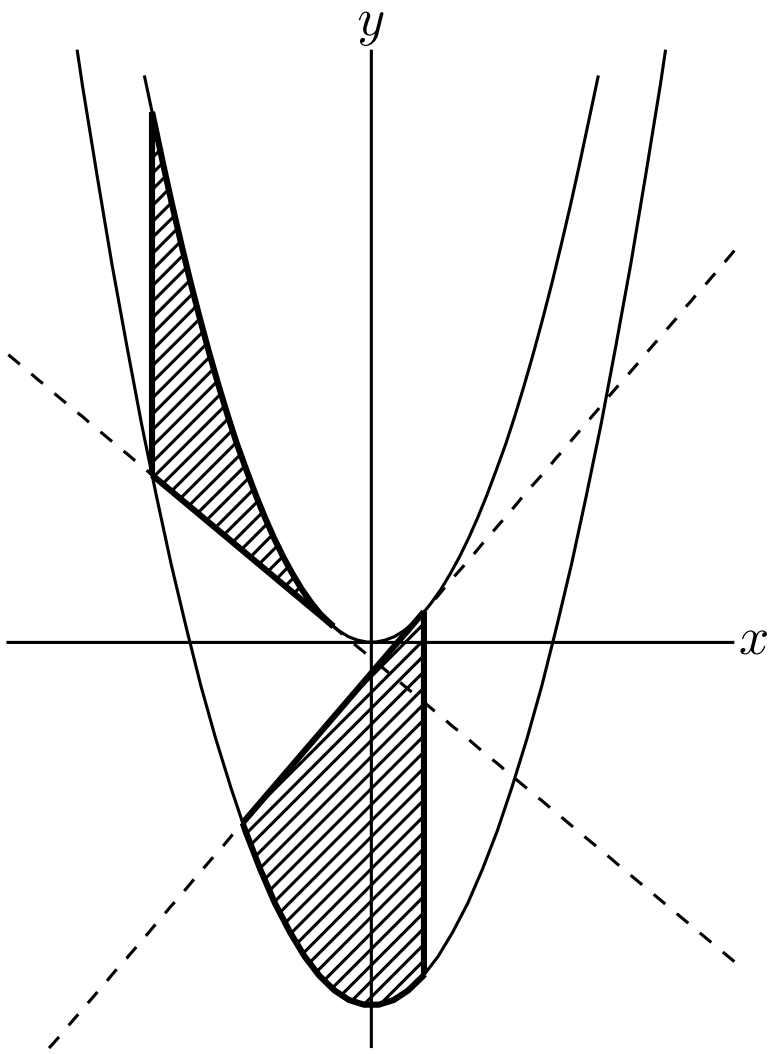

4. Problem of TEX edition

Characteristics of edition via TEX

1. high quality in graphics
2. limitation in computing and programming capability
3. generated table tends to be inappropriate
4. page layout can not be set flexibly

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x	0	$\cdots$	$\frac{\pi}{6}$	$\cdots$	$\frac{5\pi}{6}$	$\cdots$	2π
y'		$+$	0	$-$	0	$+$	
y	2	$\nearrow$	$\frac{\pi}{6}+\sqrt{3}$	$\searrow$	$\frac{5\pi}{6}-\sqrt{3}$	$\nearrow$	$2+2\pi$

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x	0	$\cdots$	$\frac{\pi}{6}$	$\cdots$	$\frac{5}{6}\pi$	$\cdots$	2π
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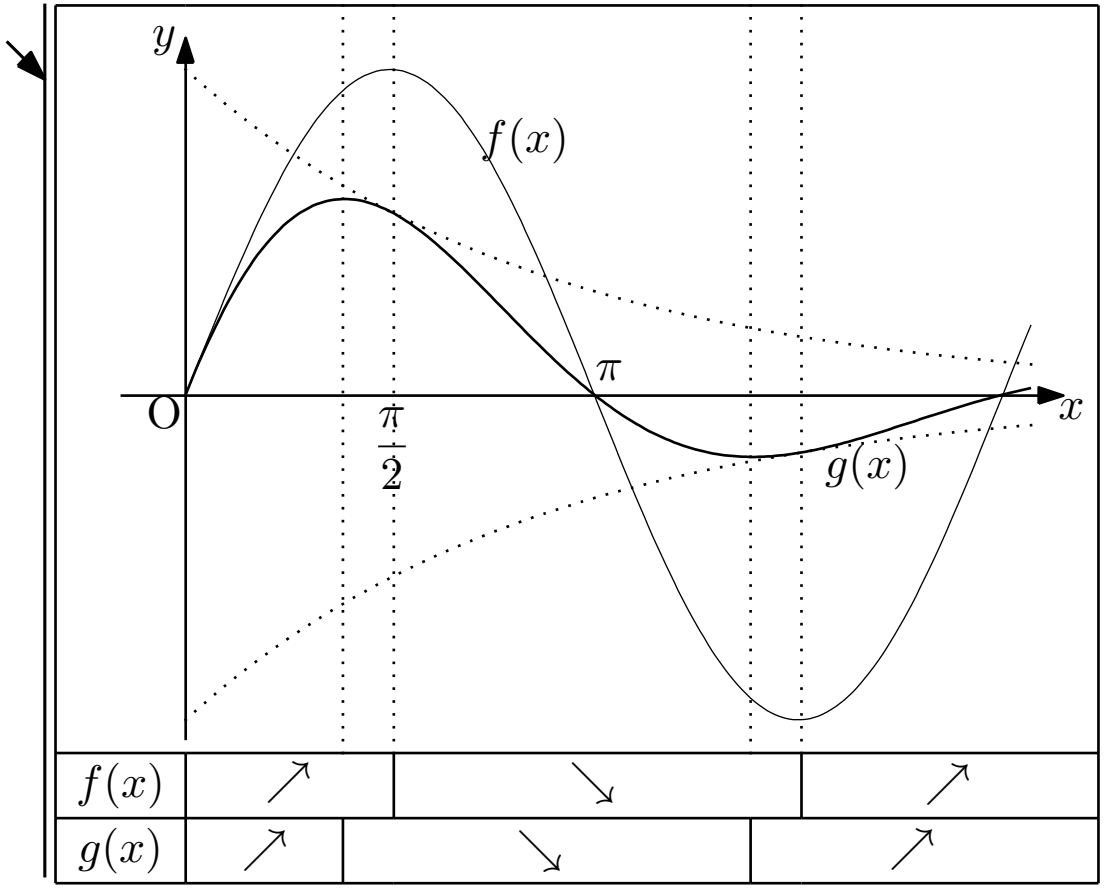

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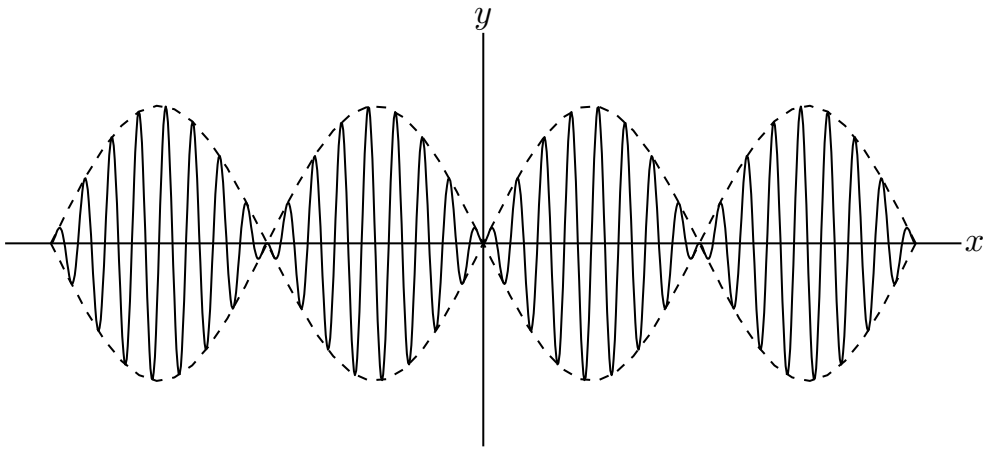

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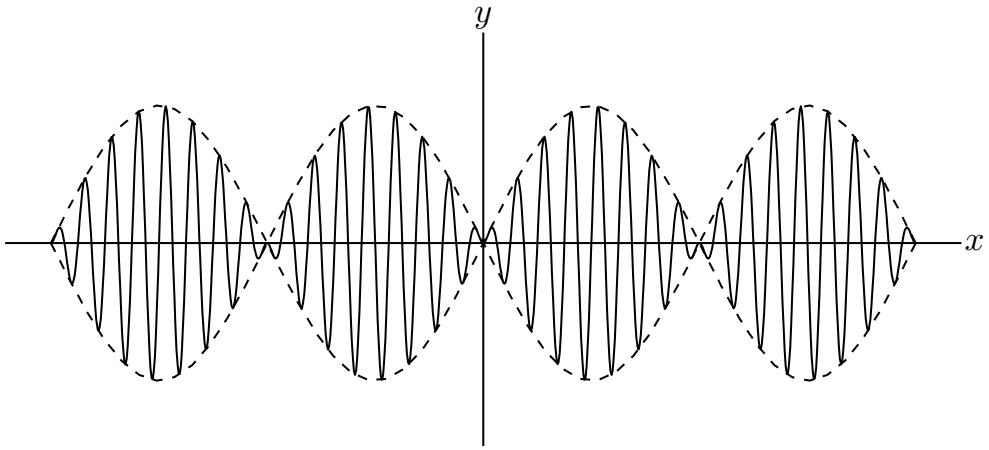

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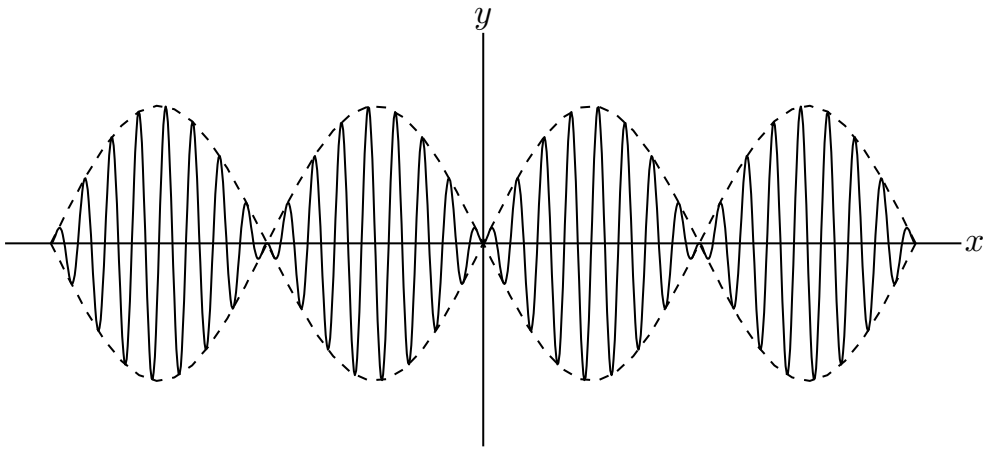

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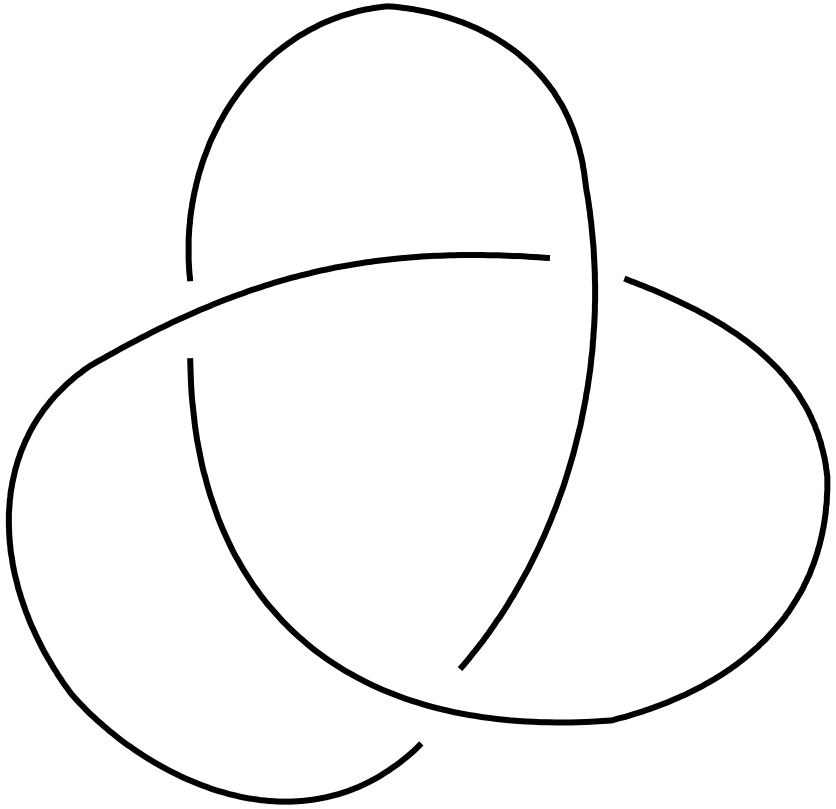

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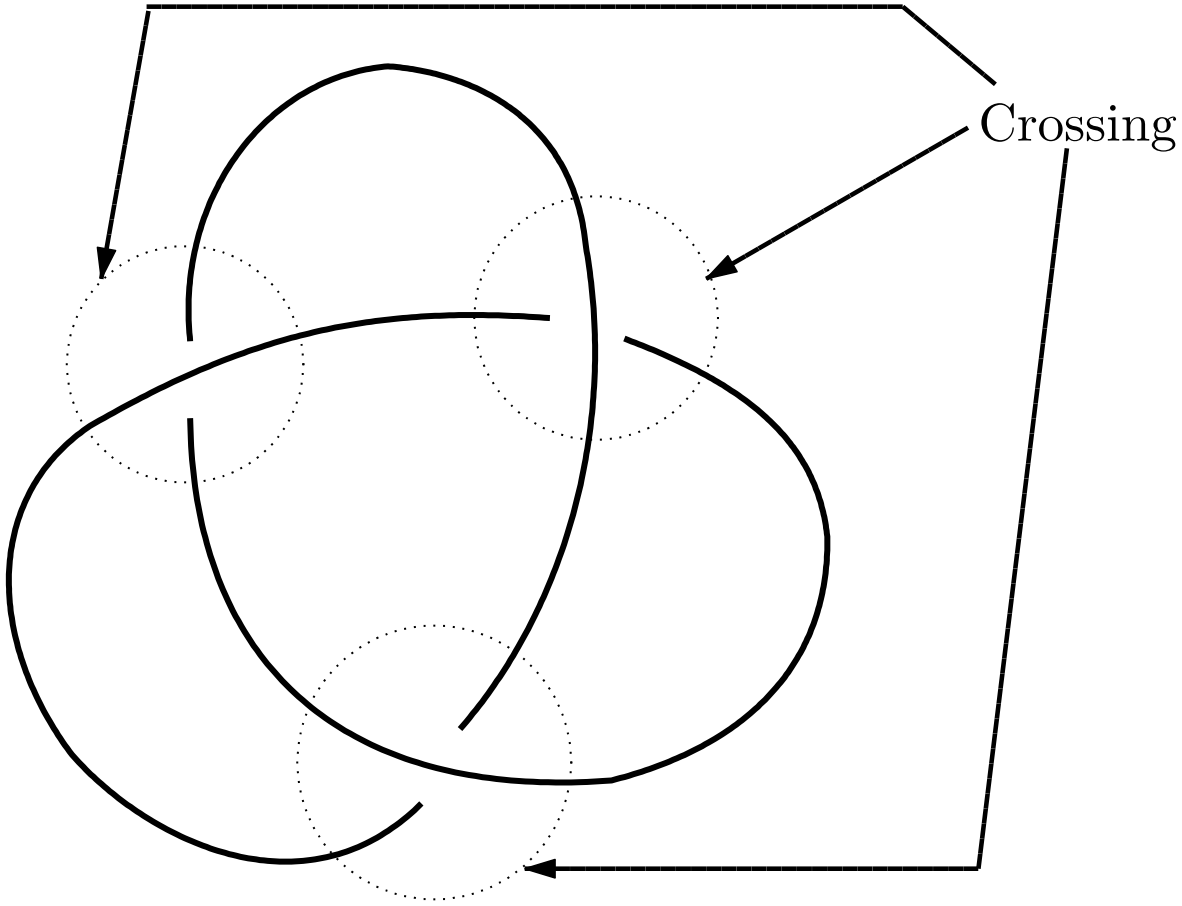

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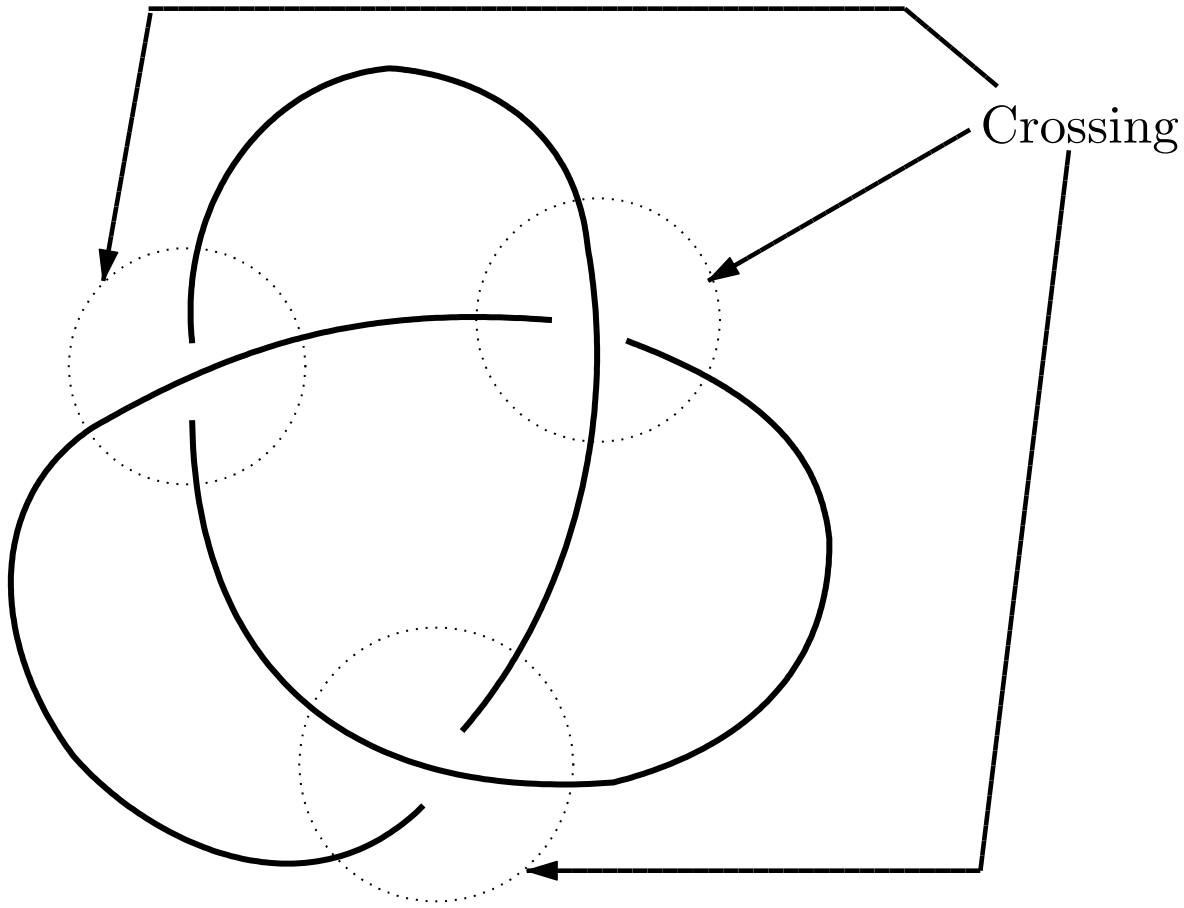
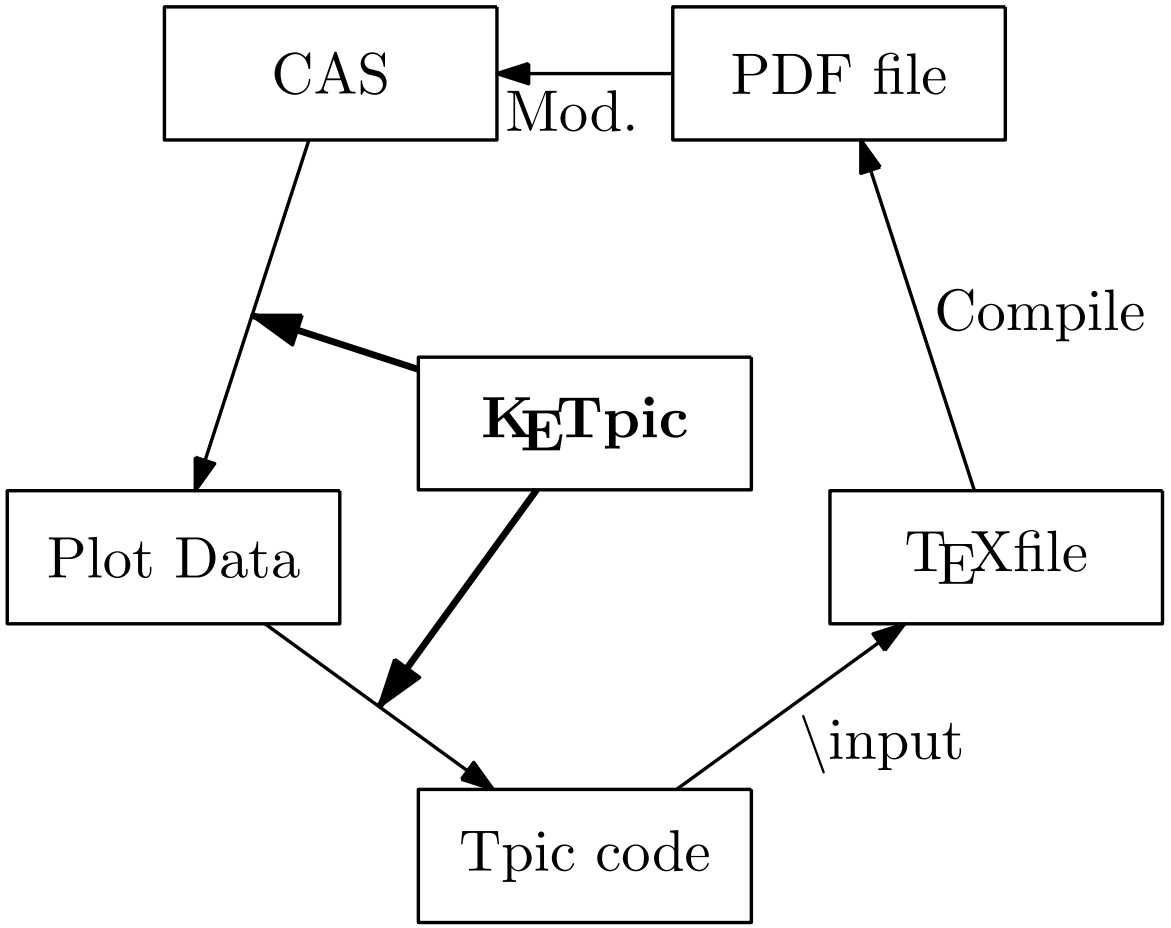


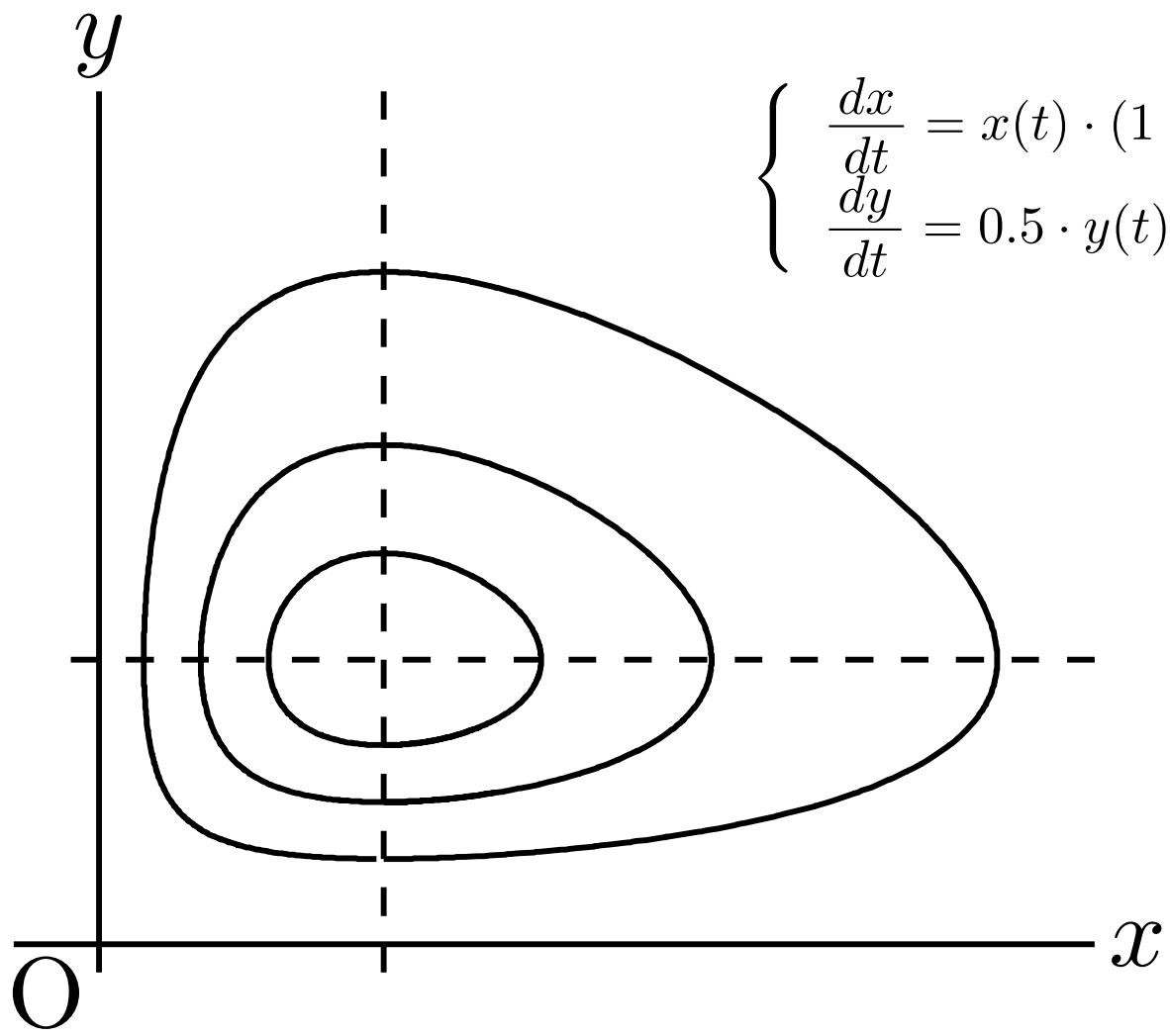
Bezier curves can be generated via KETCindy.

5. CAS+KETpic



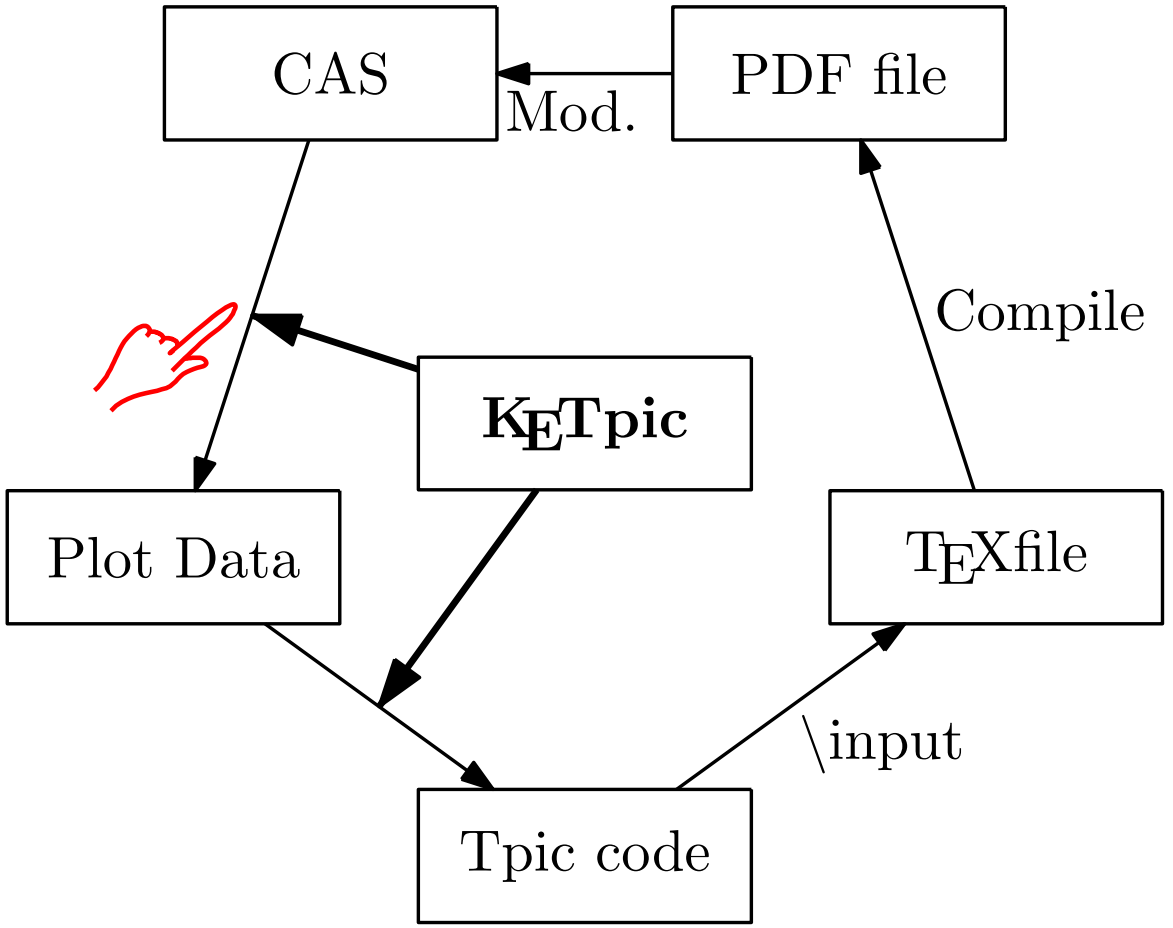
http://ketpic.com

5. CAS+KETpic



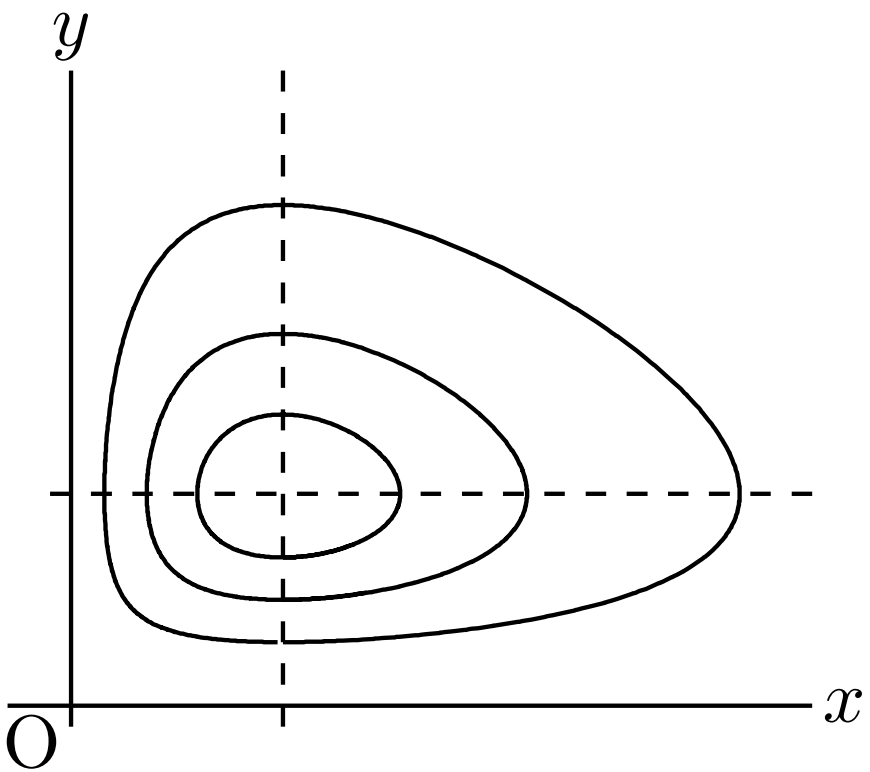
$$\begin{cases} \dfrac{dx}{dt} = x(t) \cdot (1 - y(t)) \\ \dfrac{dy}{dt} = 0.5 \cdot y(t) \cdot (x(t) - 1) \end{cases}$$

5. CAS+KETpic


CAS
Mod.
PDF file
Compile
KETpic
Plot Data
TEXfile
\input
Tpic code

5. CAS+KETpic

```
S1=NDSolve[{x'(t)==x[t]*(1-y[t]),y'[t]==0.5*y[t]*(x[t]-1),
                                    x[0]==**,y[0]==**},{x,y},{t,10}];
PS1=ParametricPlot[Evaluate[{x[t],y[t]}/.S1],{t,0,10}];
```



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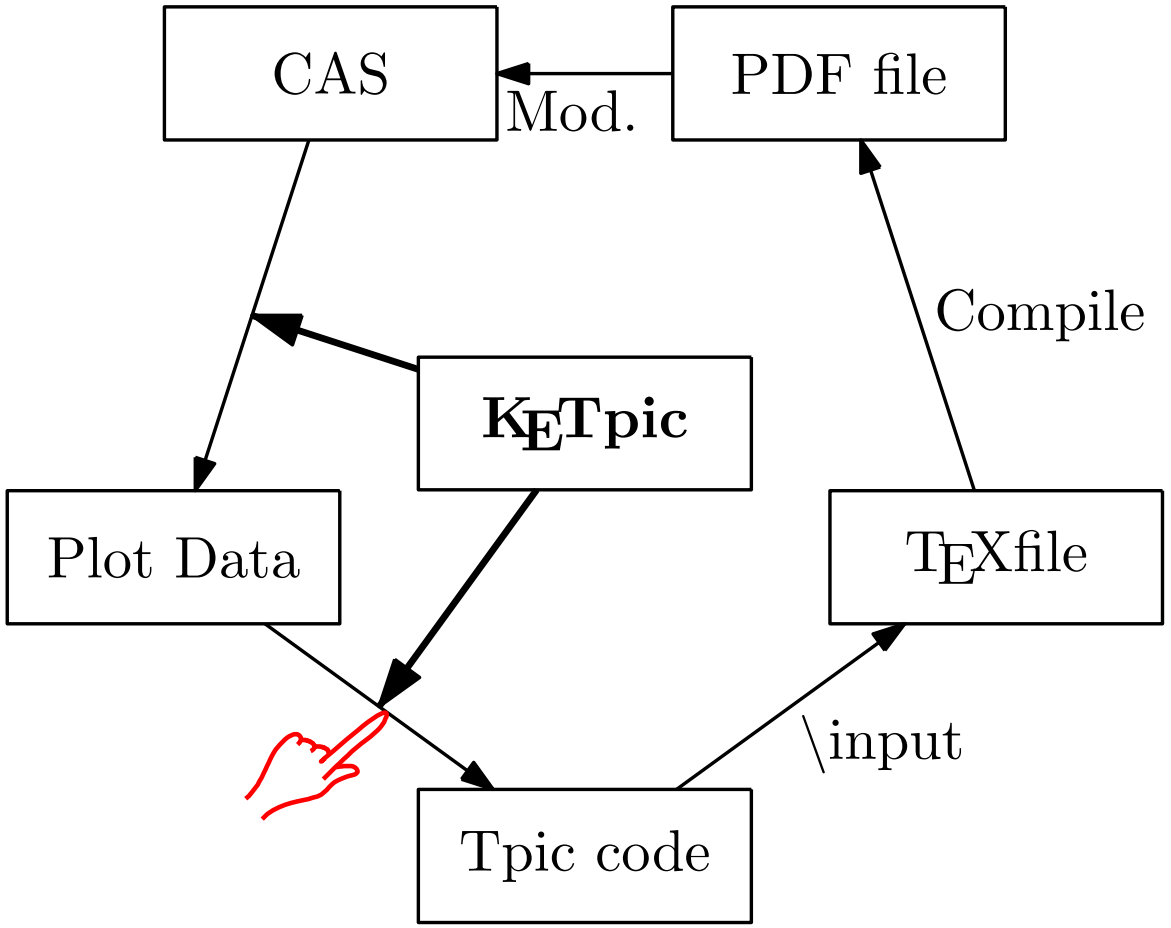
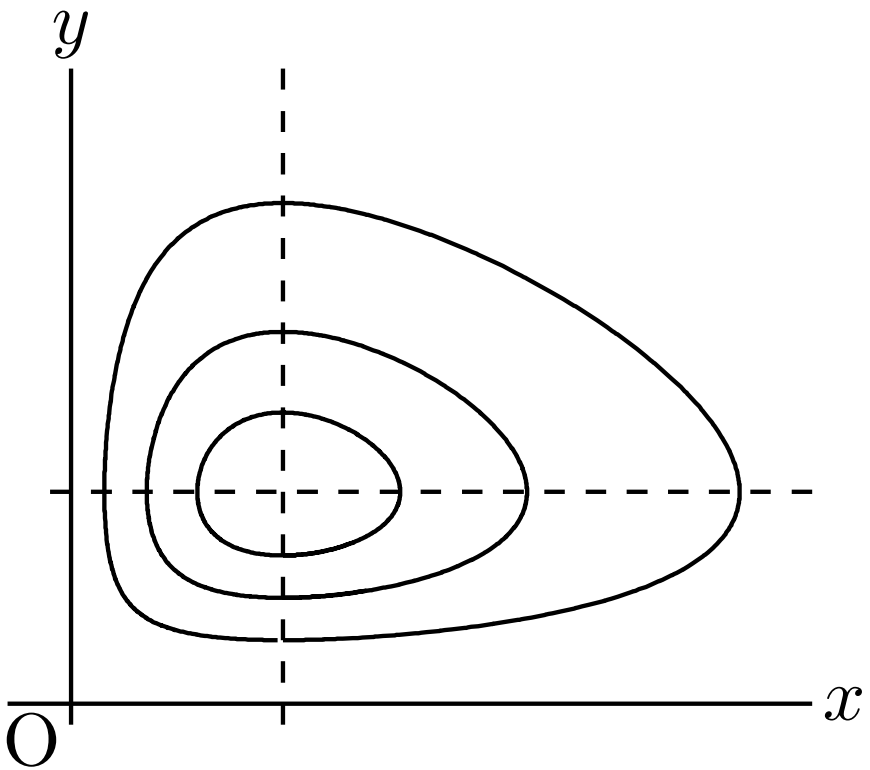

CAS
Mod.
PDF file
Compile
KETpic
Plot Data
TEXfile
\input
Tpic code

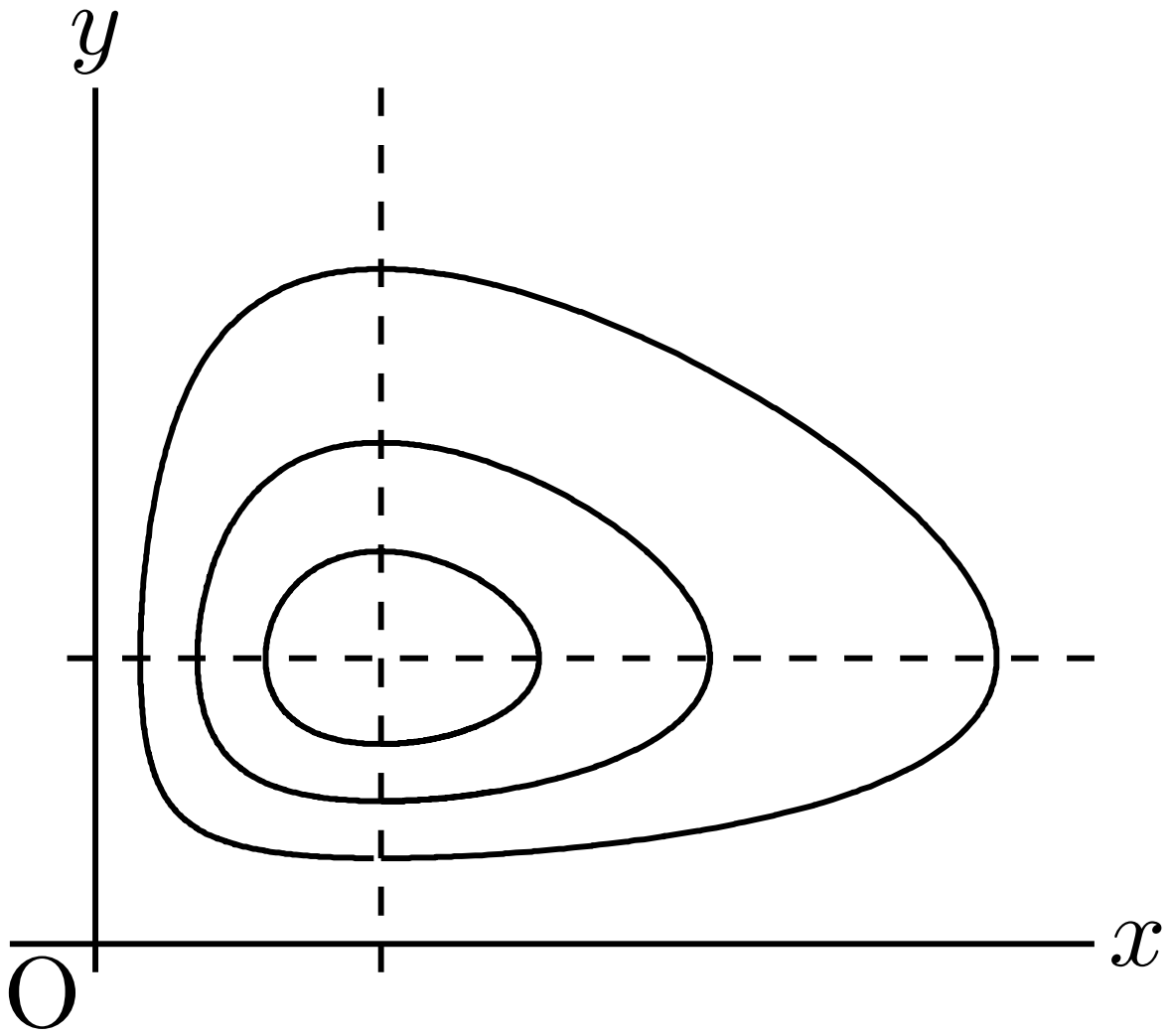
5. CAS+KETpic

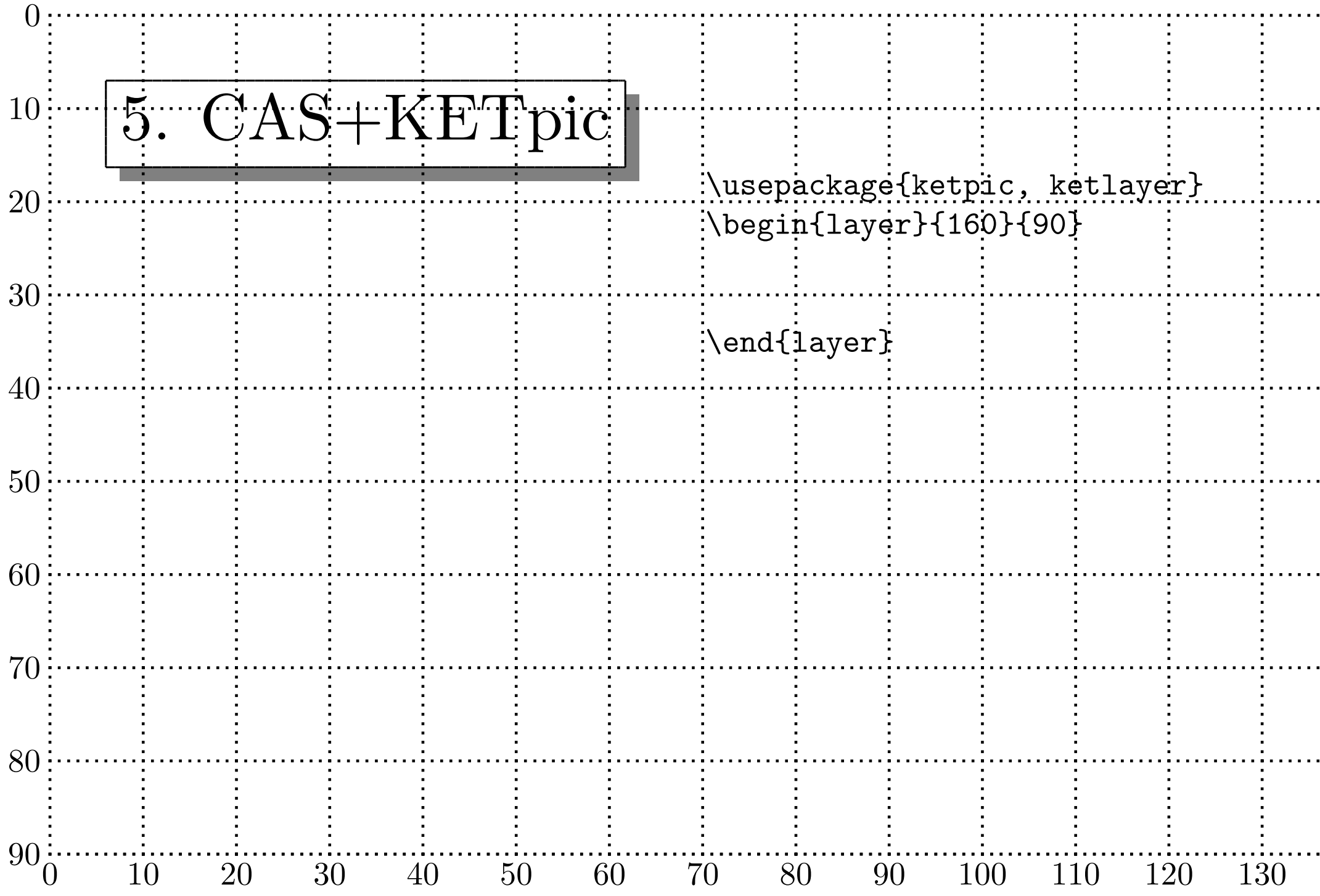
```
Openfile(''fig.tex'',''1cm'');
  Drwline(PS1);
Closefile(''1'');
```

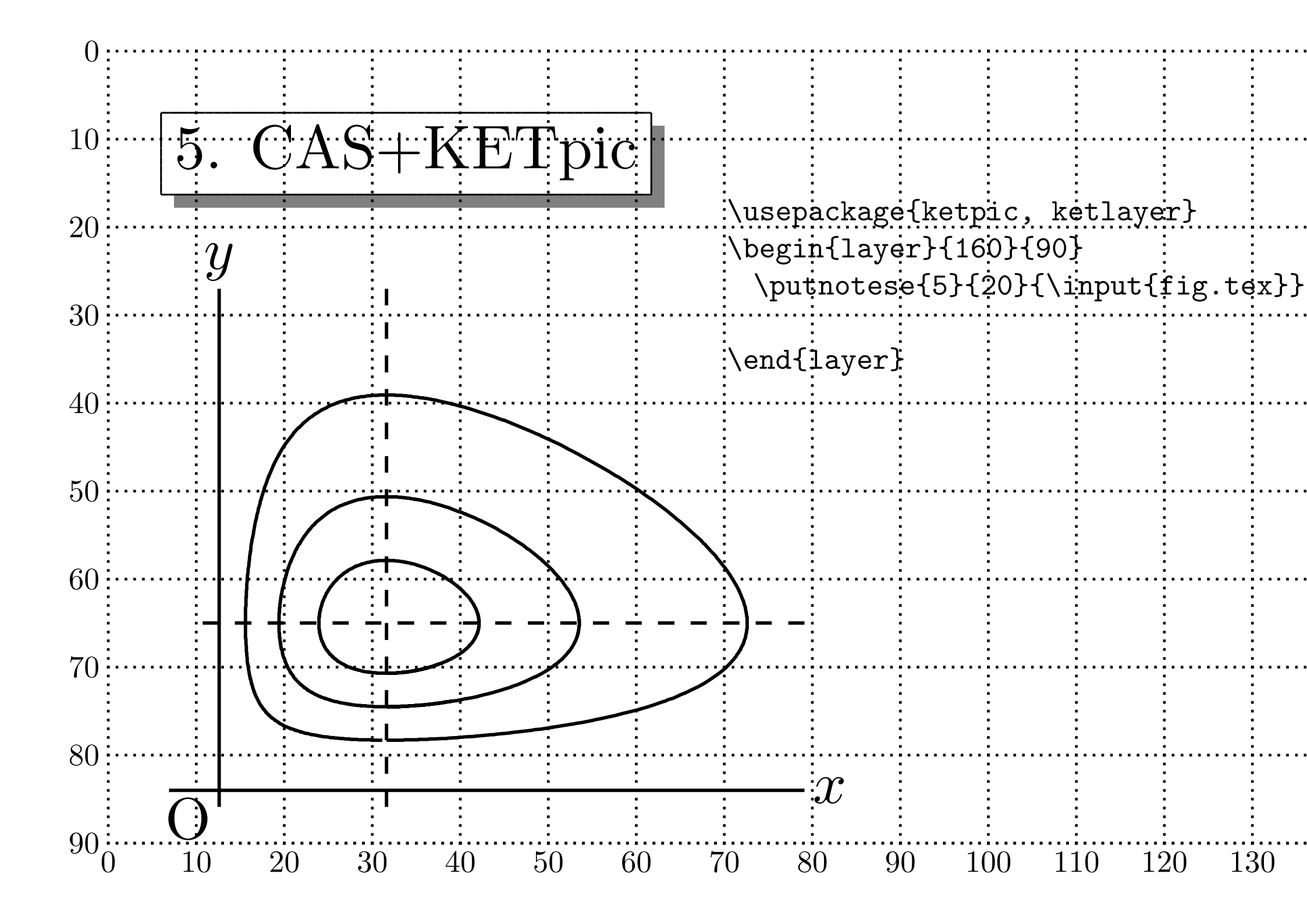


5. CAS+KETpic

ketlayer




5. CAS+KETpic
\usepackage{ketpic, ketlayer}
\begin{layer}{160}{90}
\end{layer}
0
10
20
30
40
50
60
70
80
90
0
10
20
30
40
50
60
70
80
90
100
110
120
130


5. CAS+KETpic
\usepackage{ketpic, ketlayer}
\begin{layer}{160}{90}
\putnotese{5}{20}{\input{fig.tex}}
\end{layer}
y
x
O
0
10
20
30
40
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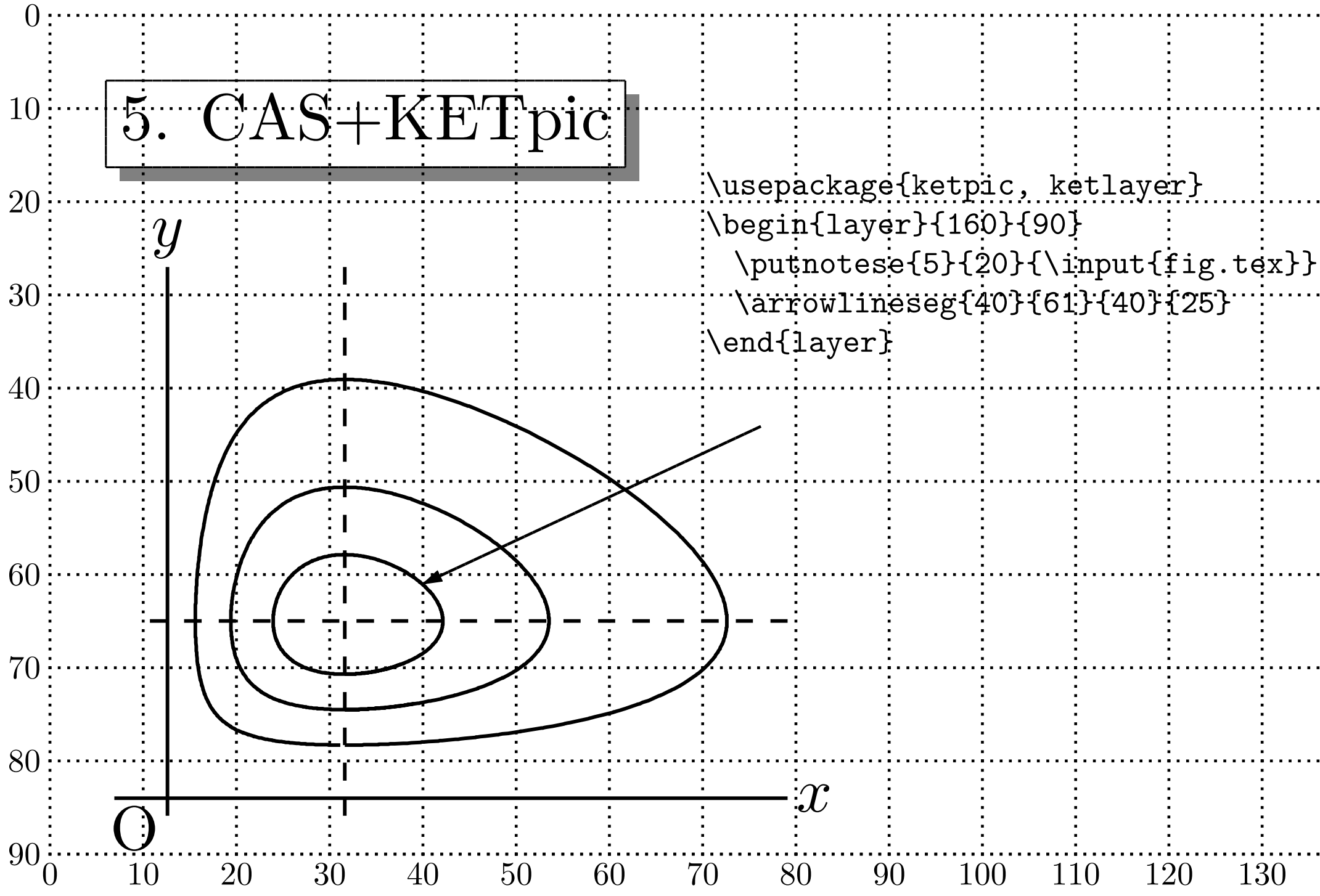
80
90
100
110
120
130

5. CAS+KETpic




```
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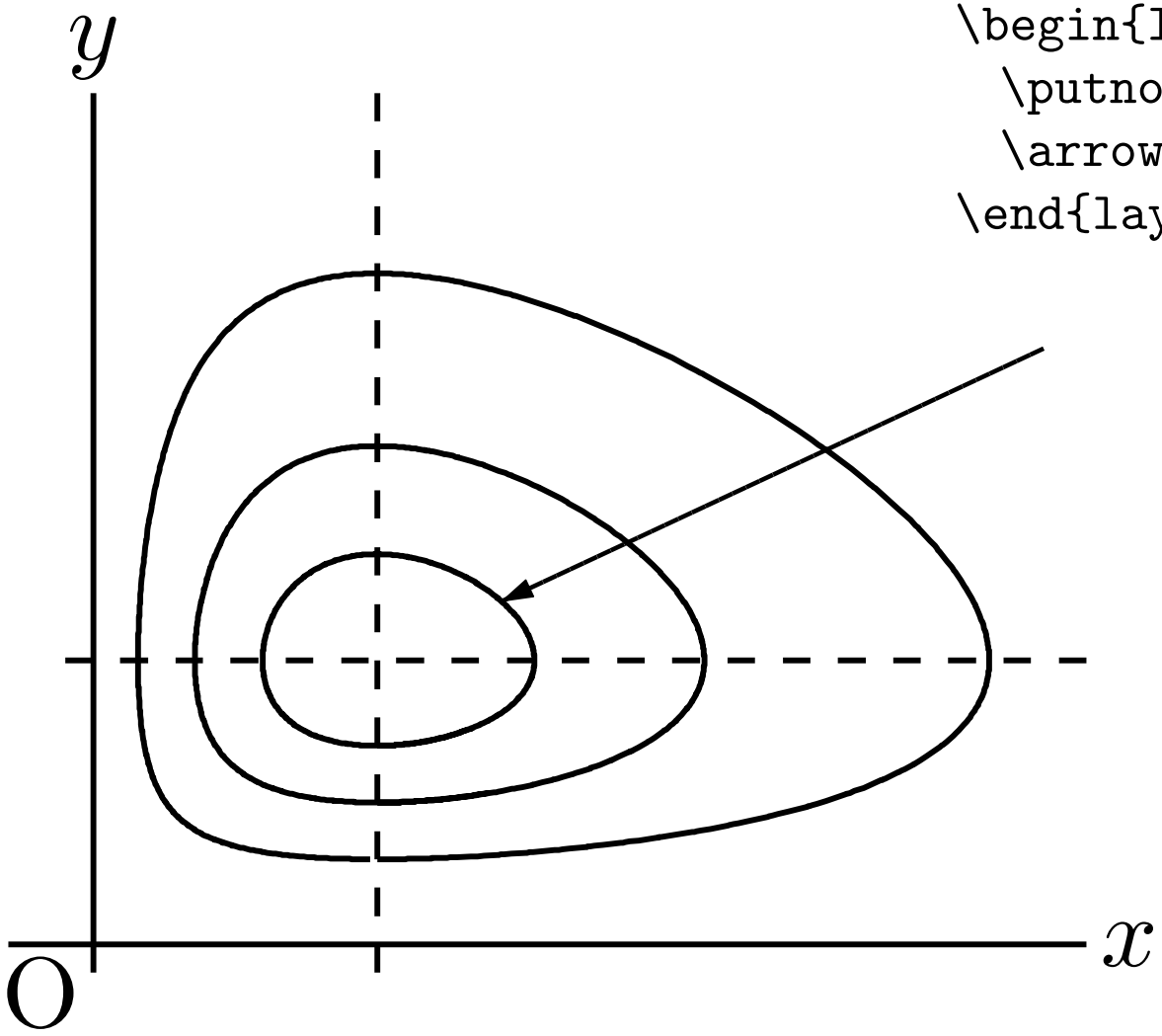
  \arrowlineseg{40}{61}{40}{25}
\end{layer}
```

5. CAS+KETpic

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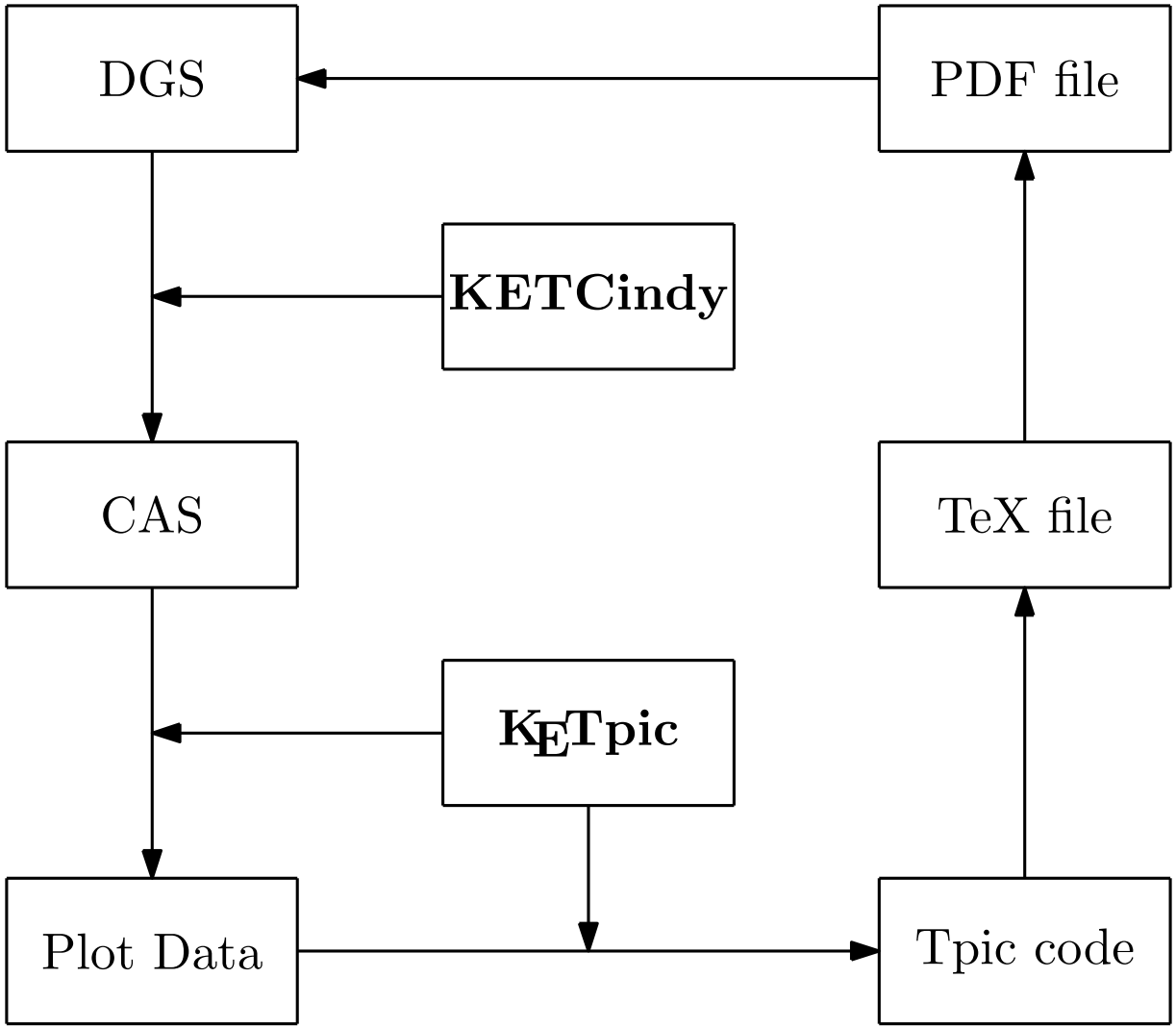
  \arrowlineseg{40}{61}{40}{25}
\end{layer}
```

6. DGS+KETCindy

From CAS to DGS

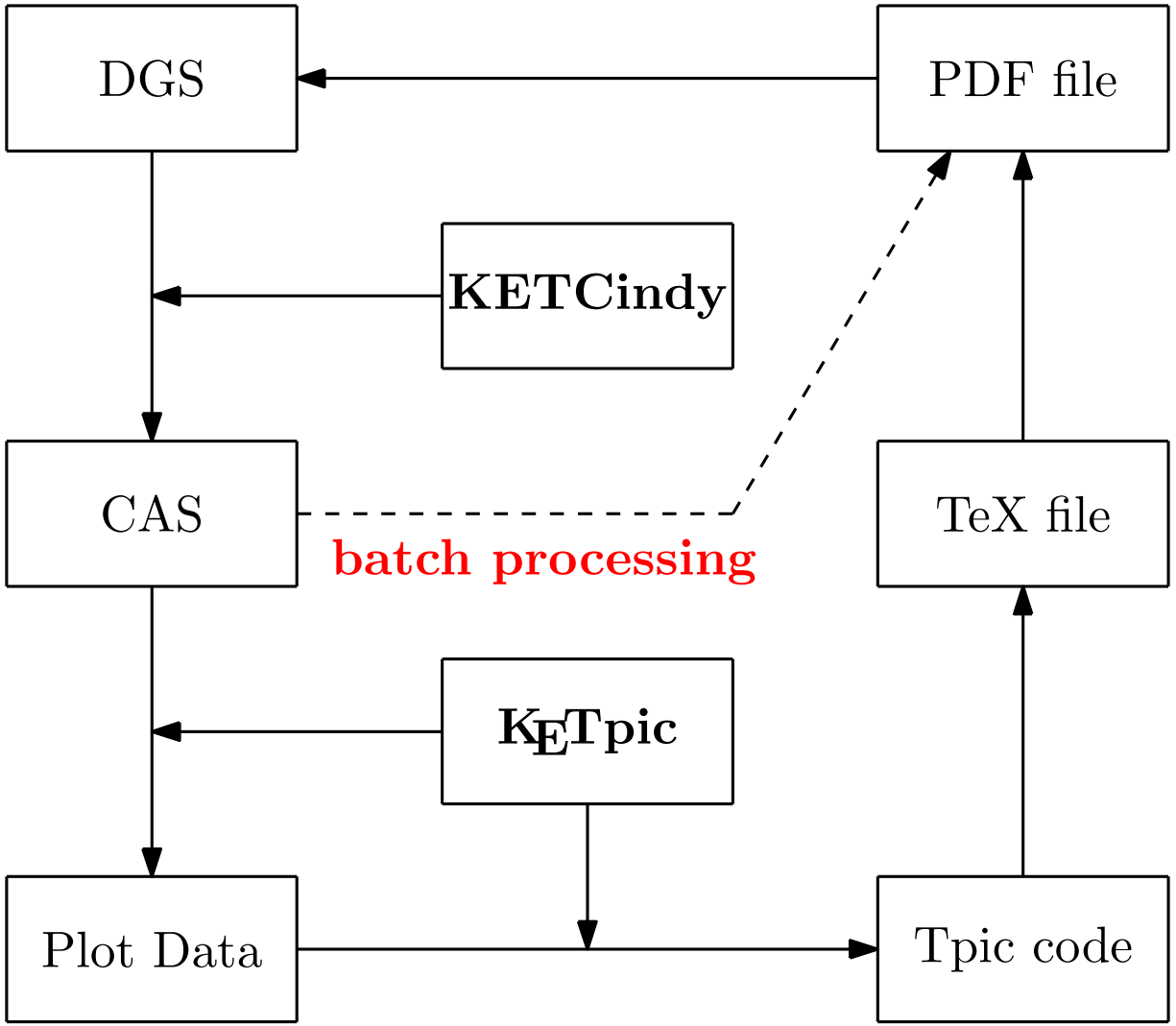
1. DGS may be inferior to CAS in computation and programming capability.
2. Interactive drawing of TEX graphics (while checking the final output) should be helpful.
3. It is desirable that the burden of writing command is reduced.

6. DGS+KETCindy

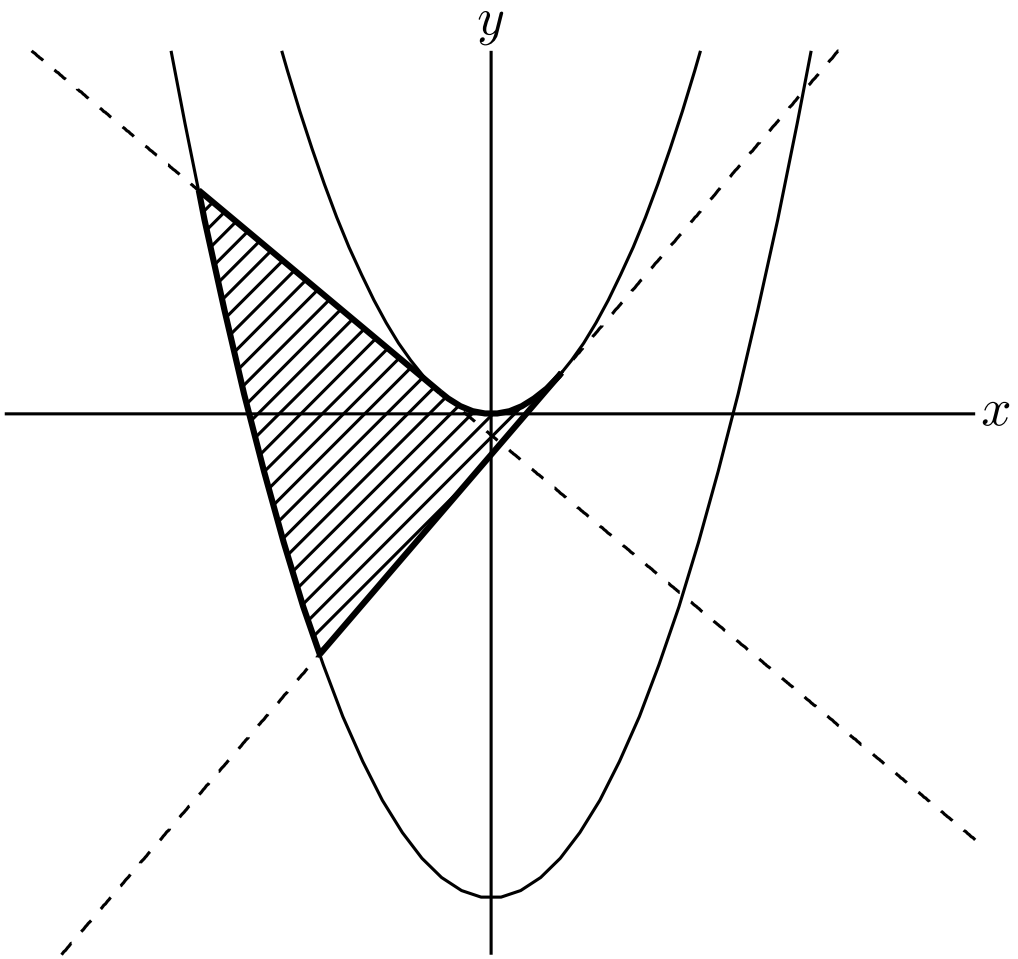


https://sites.google.com/sites/ketcindy/home

6. DGS+KETCindy

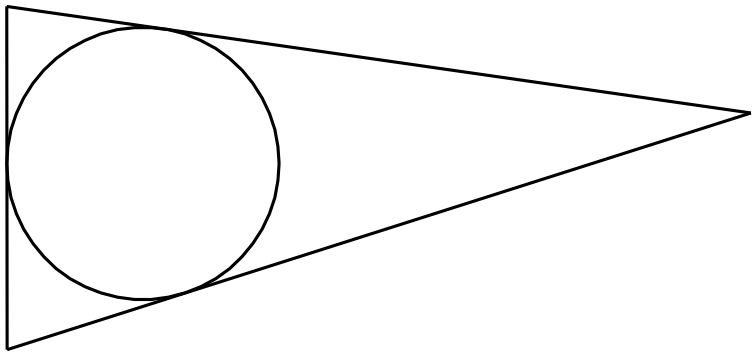


6. DGS+KETCindy



6. DGS+KETCindy

Animation



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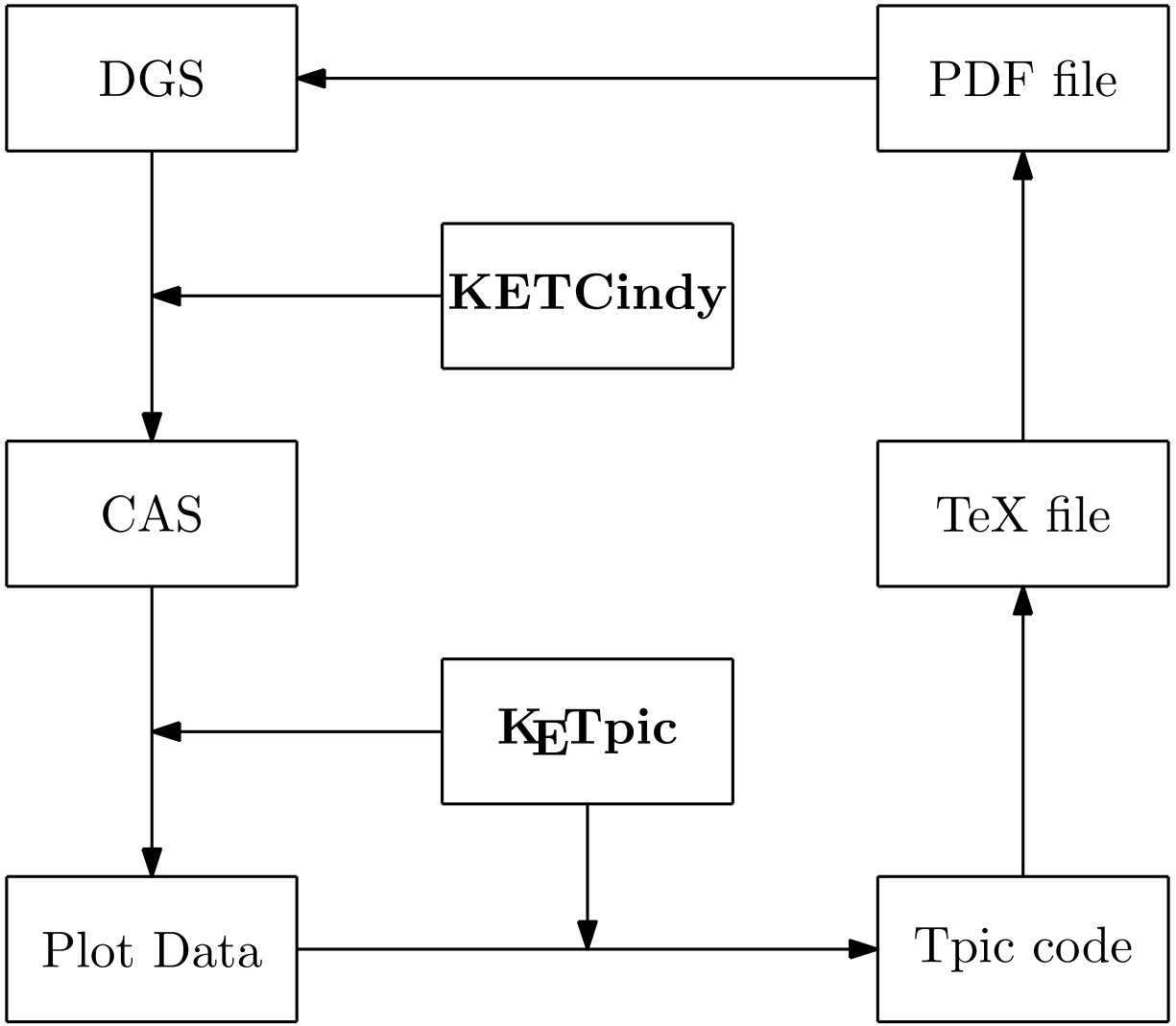

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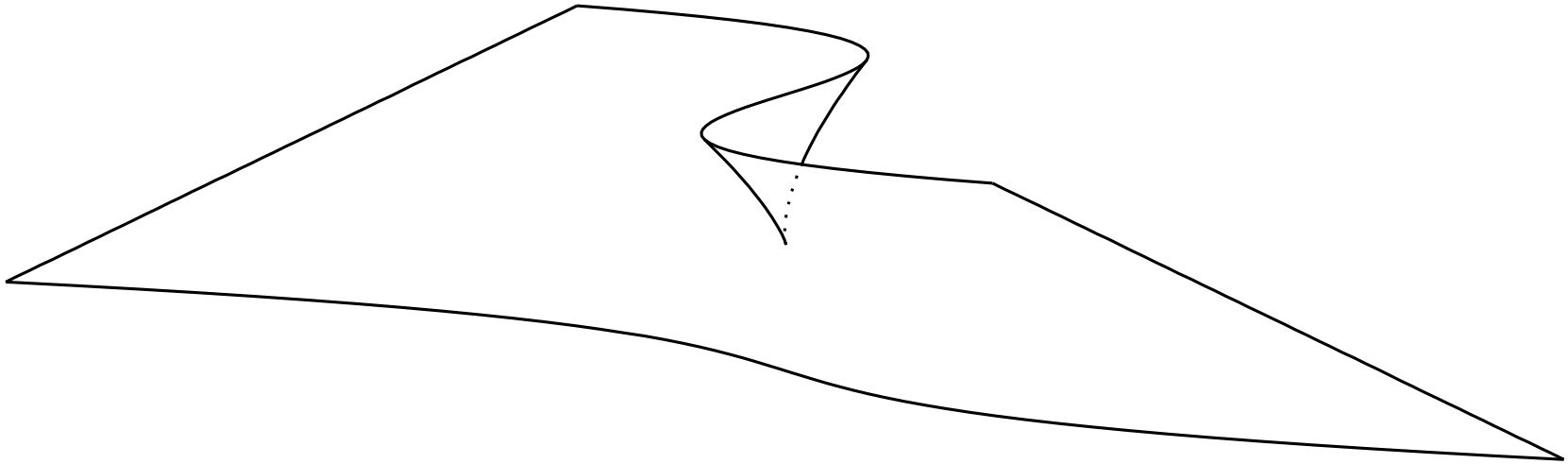
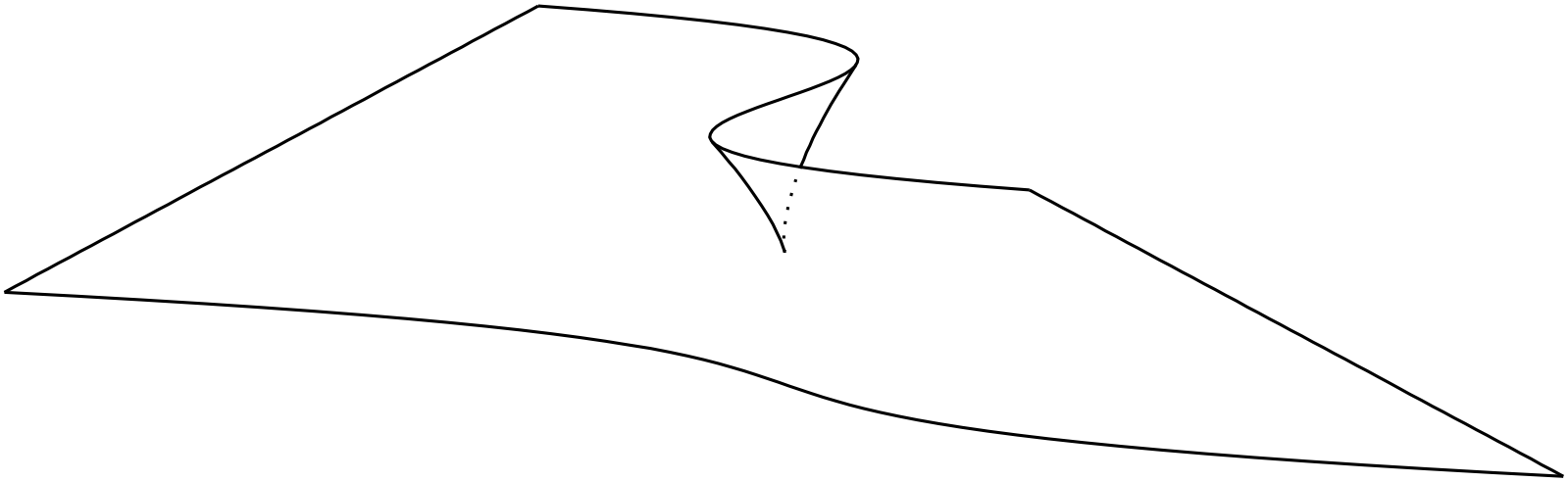


Start

End

6.DGS+KETCindy



Start

End

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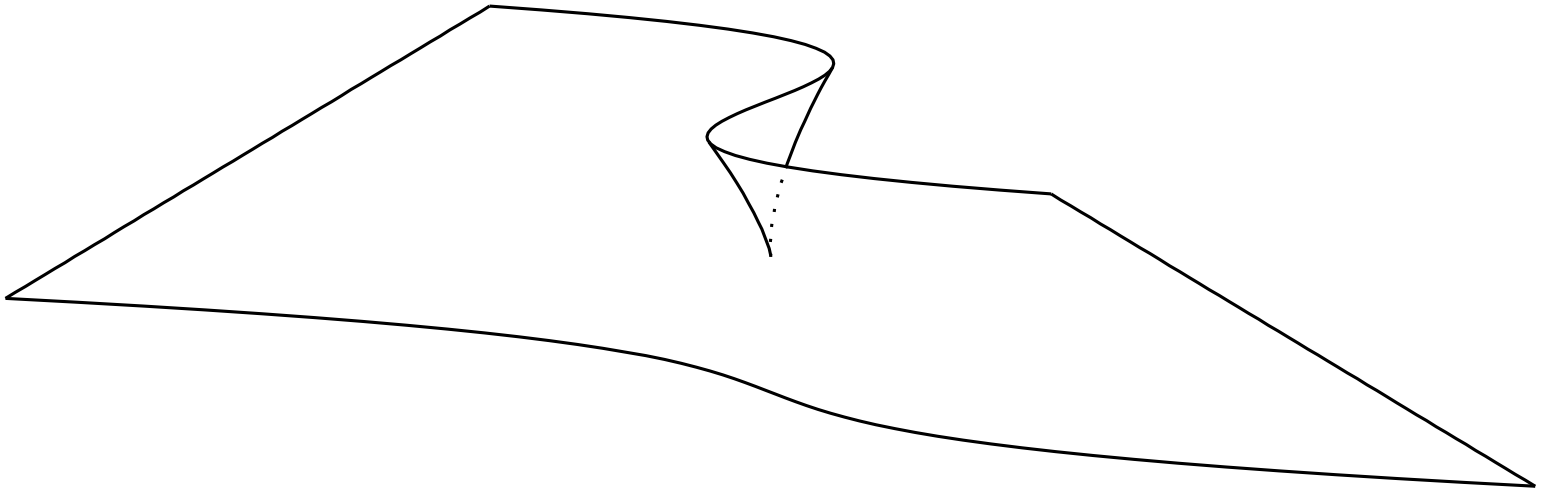
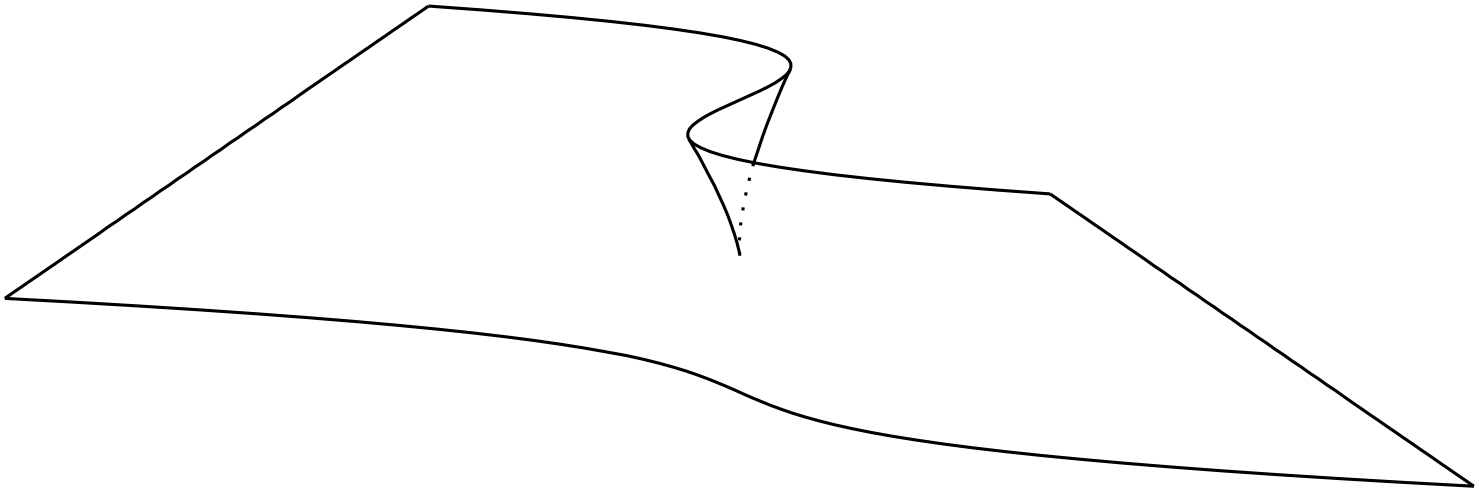


Start

End

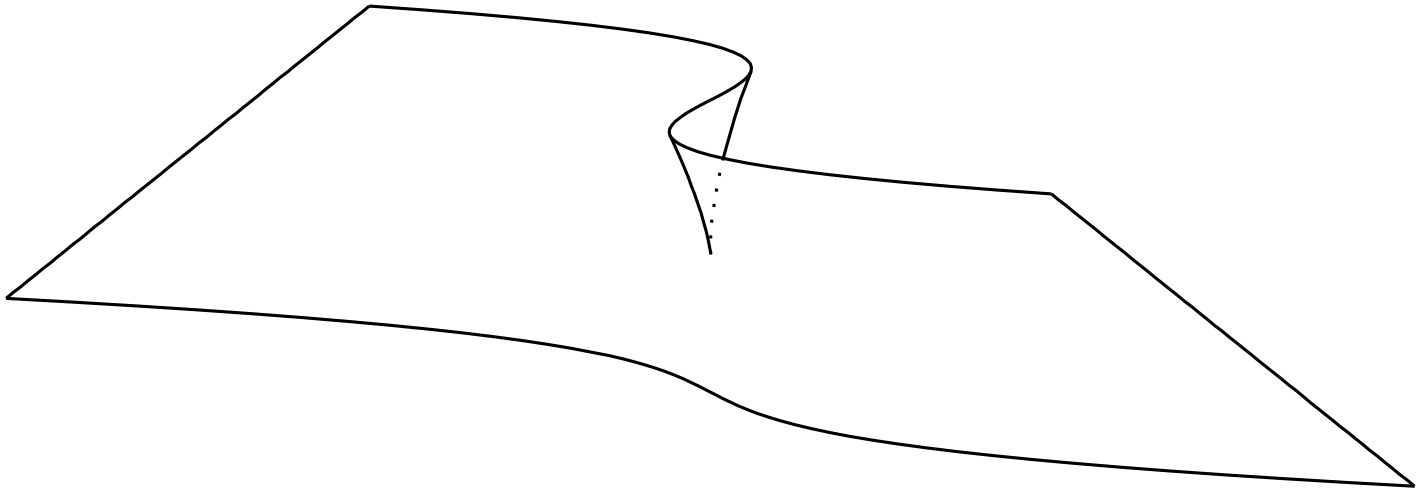
6.DGS+KETCindy



Start

End

6.DGS+KETCindy



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End

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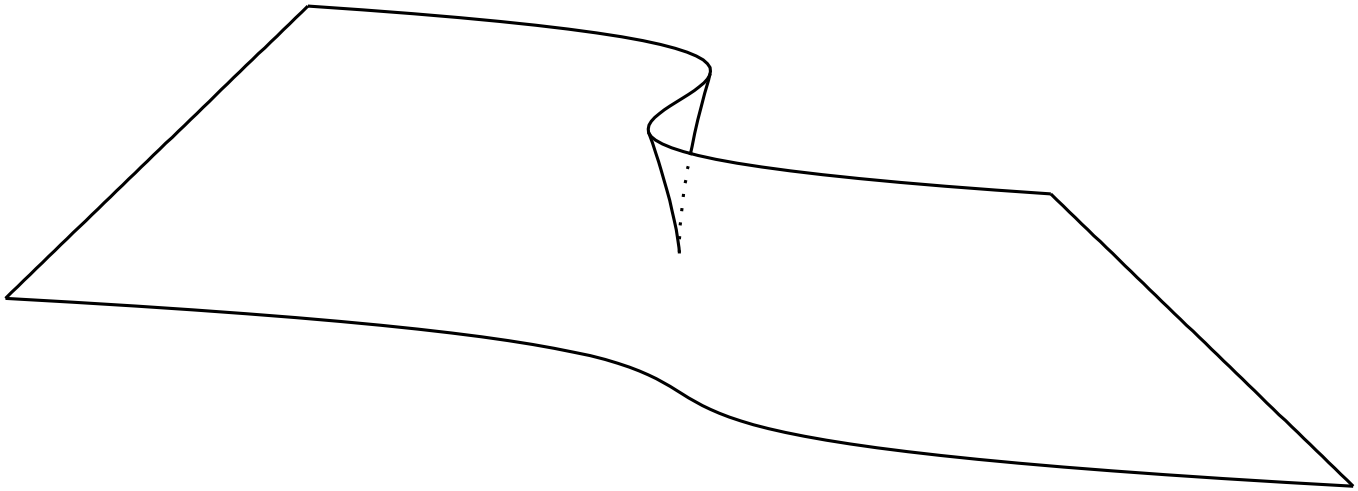
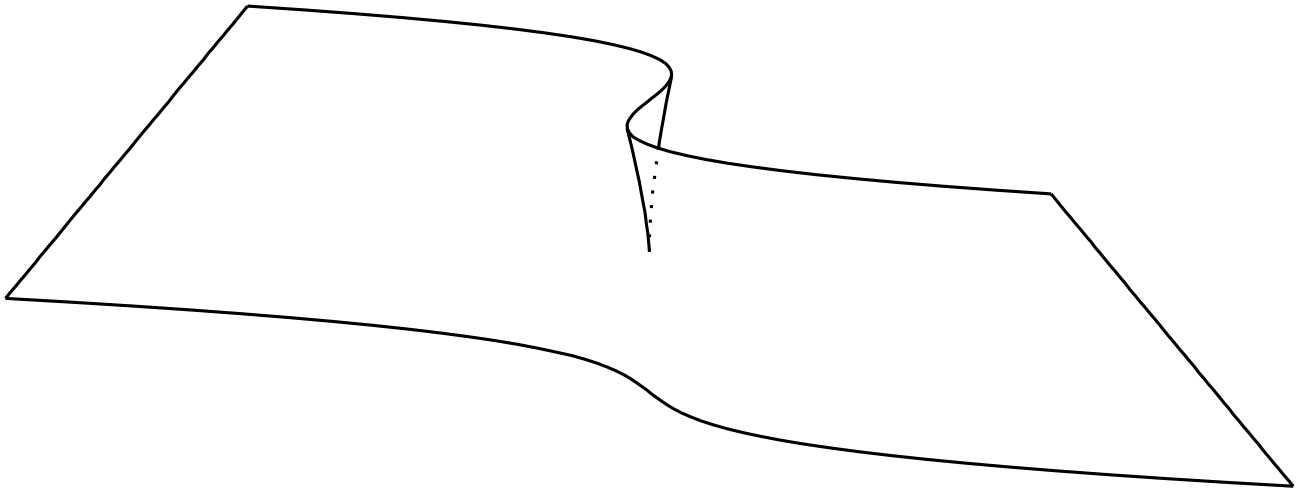


Start

End

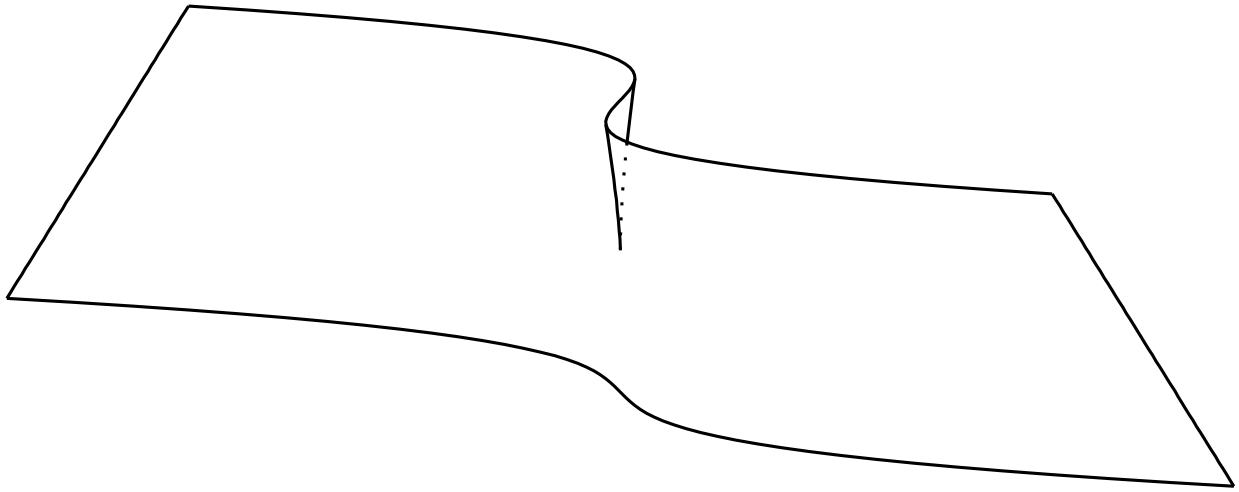
6.DGS+KETCindy



Start

End

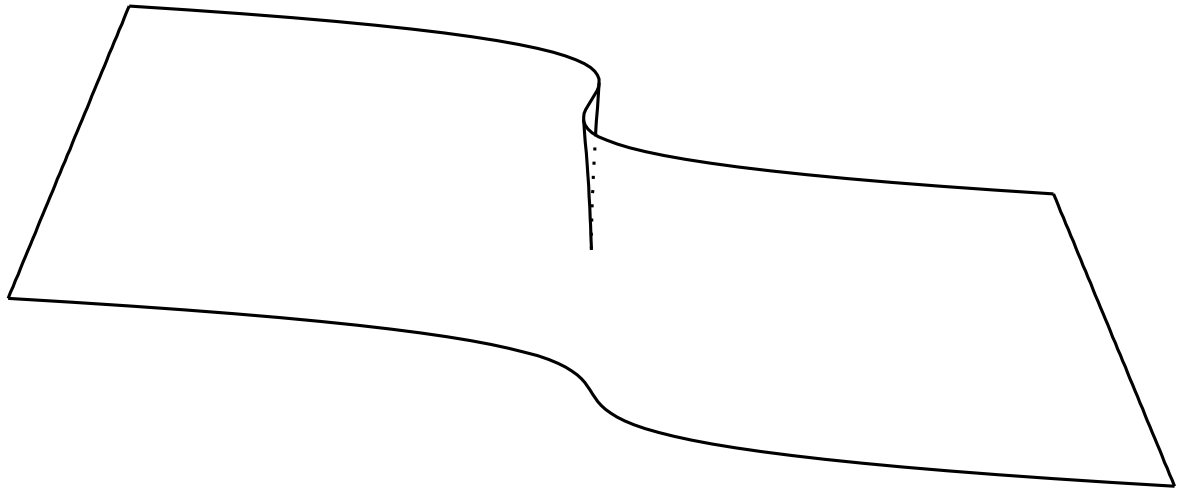
6.DGS+KETCindy



Start

End

6.DGS+KETCindy



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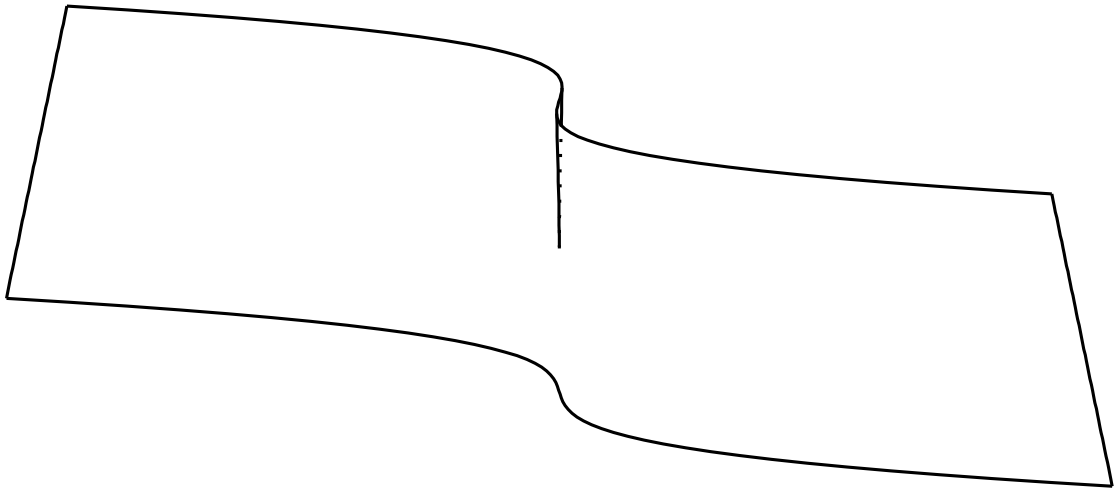
End

6.DGS+KETCindy



Start

End

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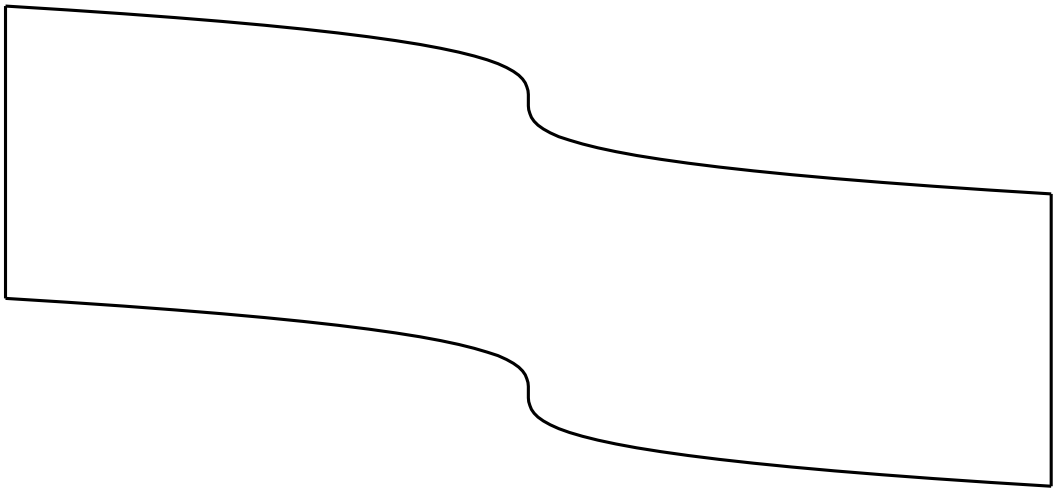

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End

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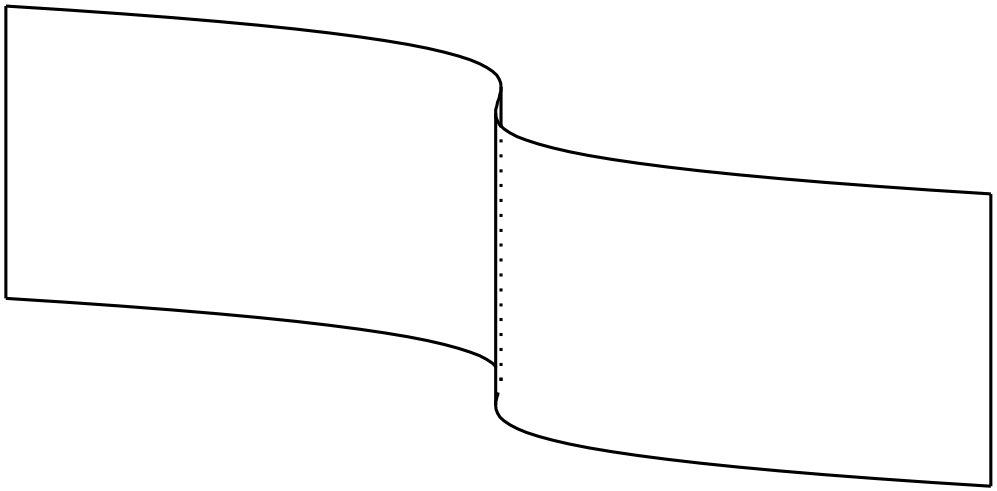

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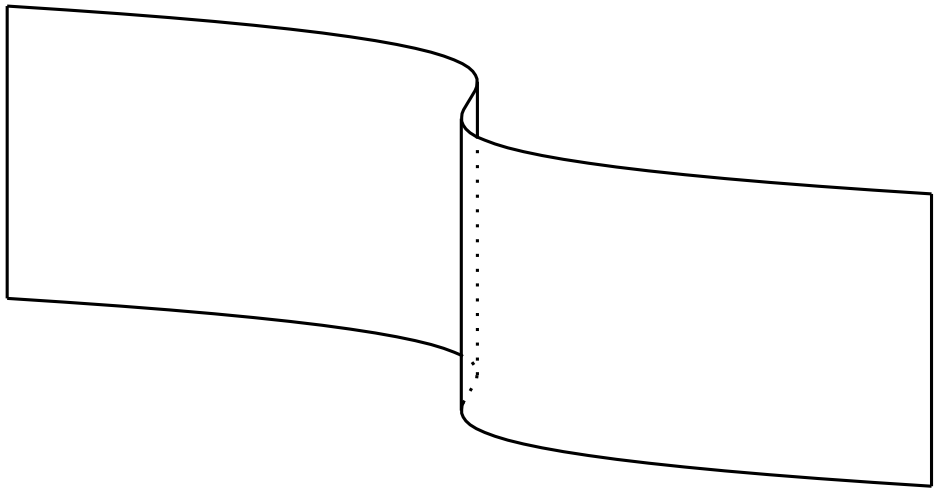

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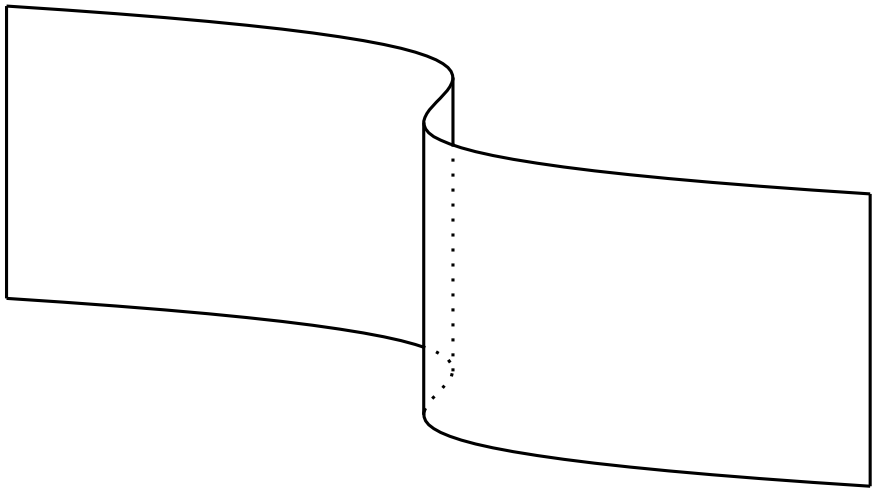
End

6.DGS+KETCindy



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End

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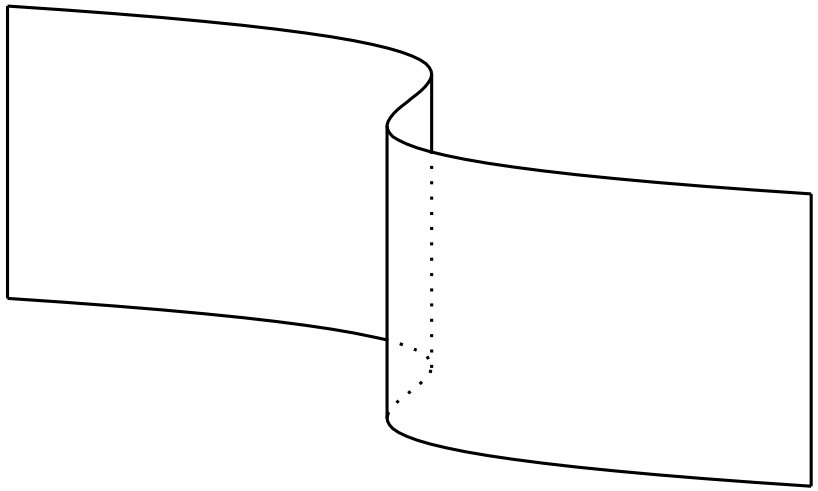

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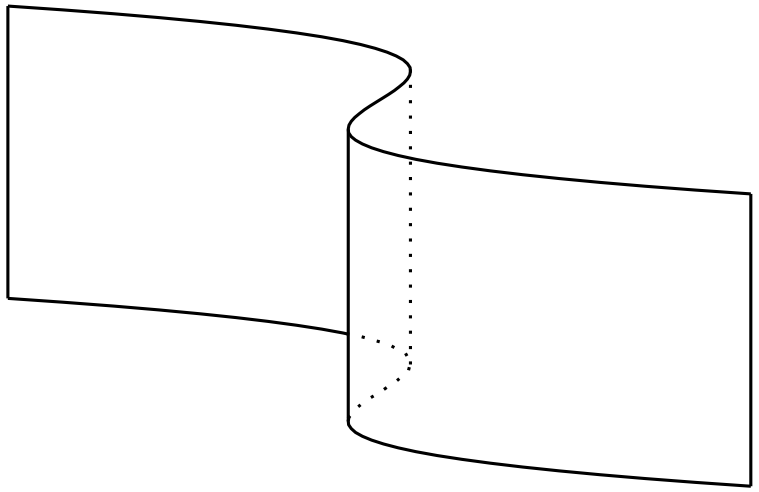

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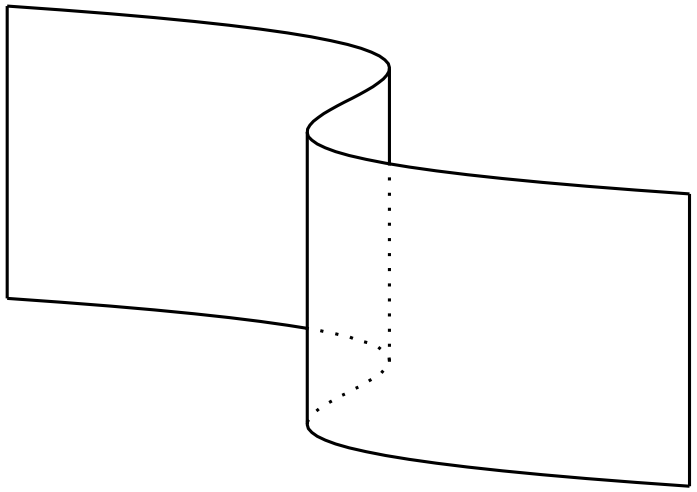

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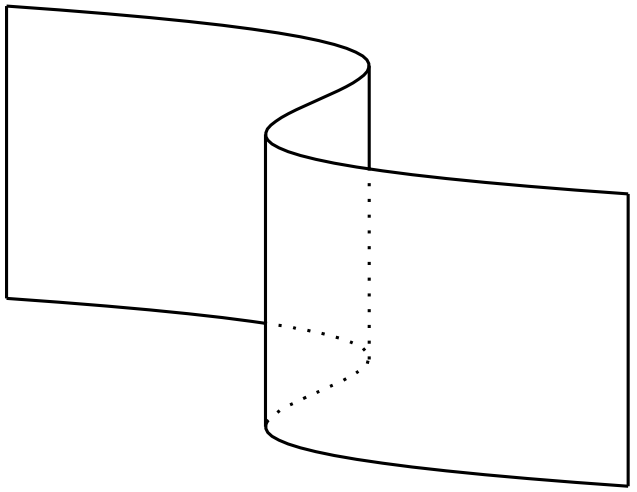

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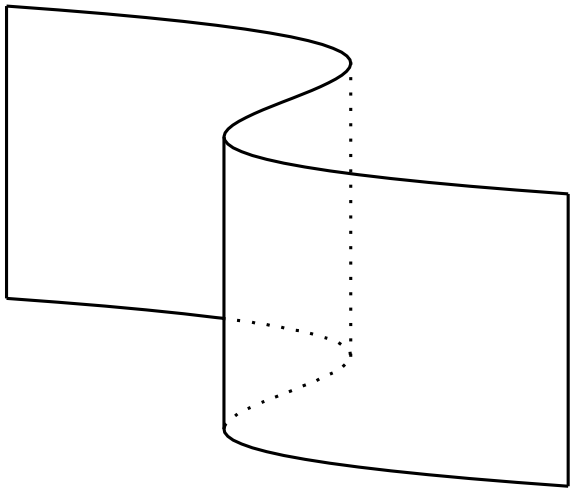
End

6.DGS+KETCindy



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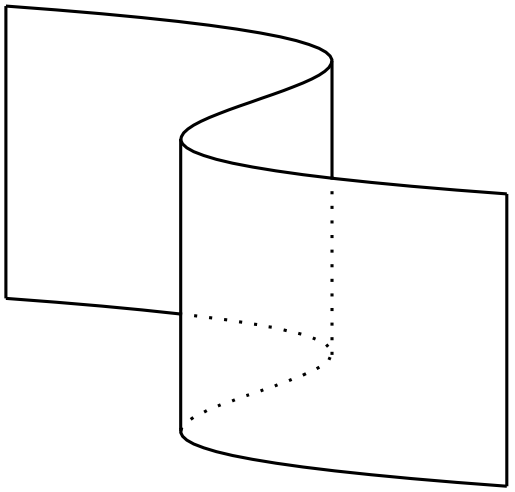
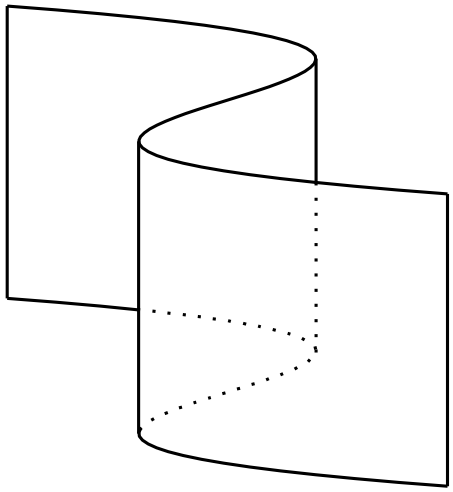
6.DGS+KETCindy



Start

End

6.DGS+KETCindy



Start

End

Tnank you very much
for your attentions!!