LABORATORY08: Report and Presentation of work on TikZ

PELE TETE

December 2025

Contents

1 801TikZ - Basic LaTeX Document

```
\documentclass[a4paper,12pt]{article}
\usepackage[T1]{fontenc}
\begin{document}
\section{This is a simple introduction to TikZ}
There is a variety of different toolsets for creating graphical objects in a TeX doc
ument. Themostwellknownandprobablymostwidelyusedofthesetoolsetsis
TikZ, which is a recursive acronym for ‘‘TikZ ist kein Zeichenprogramm’’ (German
for TikZ is not a drawing programme). Fromthenameofthetoolsetyoucansee
that generating a figure in TikZ will not work through drawing the figure like you
might befamiliar with doing in Paint or similar drawing programmes. To create a
figure using TikZ we will need to code it by using specific TeX commands. We will
take a look at the basics of TikZ here.
Three useful references and sources of inspiration for creating TikZ figure are:

• TheWikibooksentryonTikZ:https://en.wikibooks.org/wiki/LaTeX/PGF/TikZ.
• TheCTANentryonTikZwiththeofficialhandbookandotherdocumentation:
https://www.ctan.org/pkg/pgf.

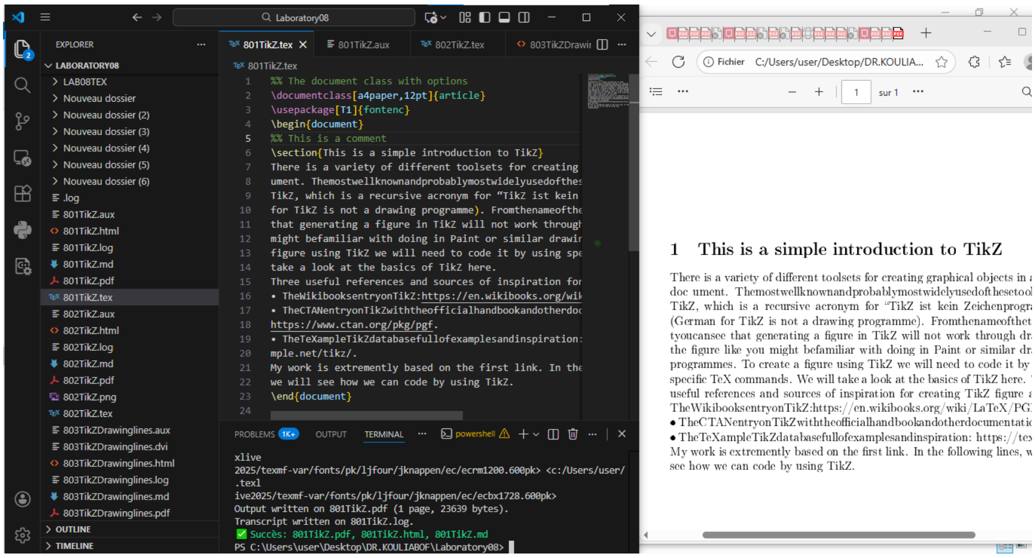
• TheTeXampleTikZdatabasefullofexamplesandinspiration: https://texa
mple.net/tikz/.

My work is extremely based on the first link. In the following lines,
we will see how we can code by using TikZ.
\end{document}
```

Generated figure (simulation)

Standard text document without TikZ graphics.

Imported image



```
%% The document class with options
\documentclass[a4paper,12pt]{article}
\usepackage[T1]{fontenc}
\begin{document}
%% This is a comment
\section{This is a simple introduction to TikZ}
There is a variety of different toolsets for creating
ument. Themostwellknownandprobablymostwidelyusedofthes
TikZ, which is a recursive acronym for “TikZ ist kein
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https://www.ctan.org/pkg/pgf.
• TheTeXampleTikZdatabasefullofexamplesandinspiration:
mple.net/tikz/.
My work is extremently based on the first link. In the
we will see how we can code by using TikZ.
\end{document}
```

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ive2025/texmf-var/fonts/pk/ljfour/jknappen/ec/ecbx1728.600pk>
Output written on 801TikZ.pdf (1 page, 23639 bytes).
Transcript written on 801TikZ.log.
✅ Succès: 801TikZ.pdf, 801TikZ.html, 801TikZ.md
PS C:\Users\user\Desktop\DR.KOULIABOF\Laboratory08>
```

1 This is a simple introduction to TikZ

There is a variety of different toolsets for creating graphical objects in a
doc ument. Themostwellknownandprobablymostwidelyusedofthesetool
TikZ, which is a recursive acronym for “TikZ ist kein Zeichenprogra
(German for TikZ is not a drawing programme). Fromthenameofthet
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specific TeX commands. We will take a look at the basics of TikZ here.
useful references and sources of inspiration for creating TikZ figure a
TheWikibooksentryonTikZ:https://en.wikibooks.org/wiki/LaTeX/PG
• TheCTANentryonTikZwiththeofficialhandbookandotherdocumentatio
• TheTeXampleTikZdatabasefullofexamplesandinspiration: https://tex
My work is extremently based on the first link. In the following lines, w
see how we can code by using TikZ.

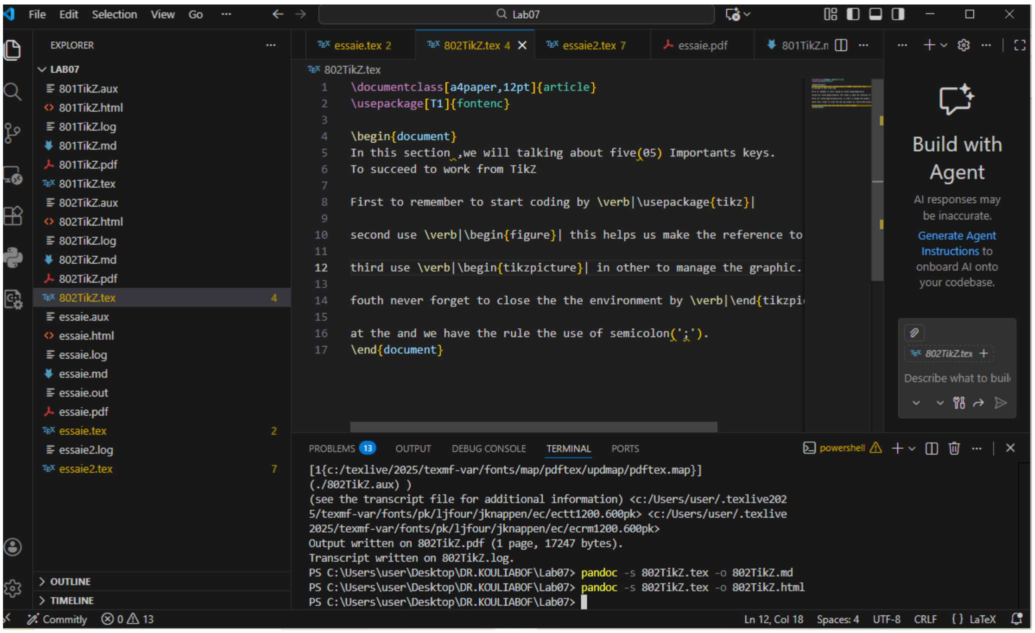
2 802TikZ.tex - Introduction to key concepts

```
\documentclass[a4paper,12pt]{article}
\usepackage[T1]{fontenc}
\begin{document}
In this section, we will talking about five(05) Importants keys.
To succeed to work from TikZ
First to remember to start coding by \usepackage{tikz}
second use \begin{figure} this helps us make the reference.
third use \begin{tikzpicture} in other to manage the graphic.
fouth never forget to close by \end{tikzpicture}
at the and we have the rule the use of semicolon(';').
\end{document}
```

Generated figure (simulation)

Explanatory text about TikZ.

Screenshot



```
\documentclass[a4paper,12pt]{article}
\usepackage[T1]{fontenc}

\begin{document}
In this section ,we will talking about five(05) Importants keys.
To succeed to work from TikZ

First to remember to start coding by \verb|\usepackage{tikz}|

second use \verb|\begin{figure}| this helps us make the reference to

third use \verb|\begin{tikzpicture}| in other to manage the graphic.

fouth never forget to close the the environment by \verb|\end{tikzpi

at the and we have the rule the use of semicolon(';').
\end{document}
```

```
[1{c:/texlive/2025/texmf-var/fonts/map/pdftex/updmap/pdftex.map}]
(./802TikZ.aux) )
(see the transcript file for additional information) <c:/Users/user/.texlive202
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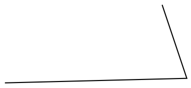
2025/texmf-var/fonts/pk/ljfour/jknappen/ec/ecrm1200.600pk>
Output written on 802TikZ.pdf (1 page, 17247 bytes).
Transcript written on 802TikZ.log.
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> pandoc -s 802TikZ.tex -o 802TikZ.md
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> pandoc -s 802TikZ.tex -o 802TikZ.html
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07>
```

---

3 803TikZDrawinglines - Drawing simple lines

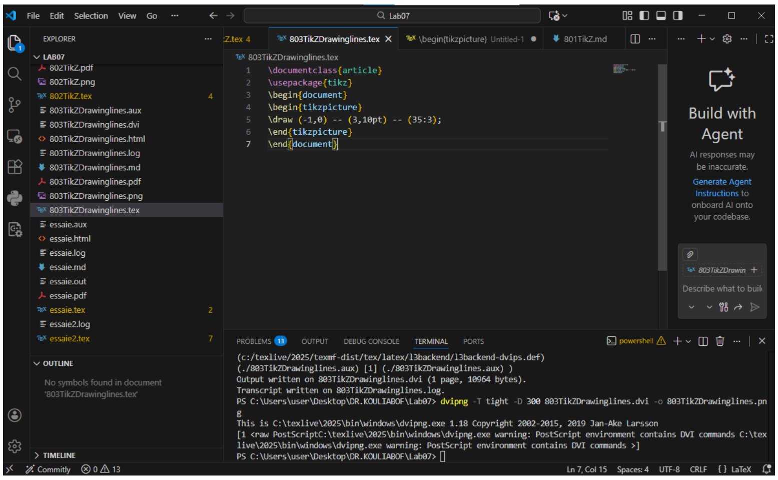
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\draw (-1,0) -- (3,10pt) -- (35:3);
\end{tikzpicture}
\end{document}
```

Generated figure



Line with polar coordinates (35:3)

Screenshot



803TikZDrawinglines.tex

```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\draw (-1,0) -- (3,10pt) -- (35:3);
\end{tikzpicture}
\end{document}
```

```
(c:/texlive/2025/texmf-dist/tex/latex/l3backend/l3backend-dvips.def)
(./803TikZDrawinglines.aux) [1] (./803TikZDrawinglines.aux) )
Output written on 803TikZDrawinglines.dvi (1 page, 10964 bytes).
Transcript written on 803TikZDrawinglines.log.
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> dvipng -T tight -D 300 803TikZDrawinglines.dvi -o 803TikZDrawinglines.pn
g
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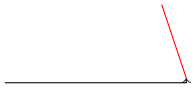
[1 <raw PostScriptC:\texlive\2025\bin\windows\dvipng.exe warning: PostScript environment contains DVI commands C:\tex
live\2025\bin\windows\dvipng.exe warning: PostScript environment contains DVI commands >]
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07>
```

4 804TikZDrawinglines - Line styles

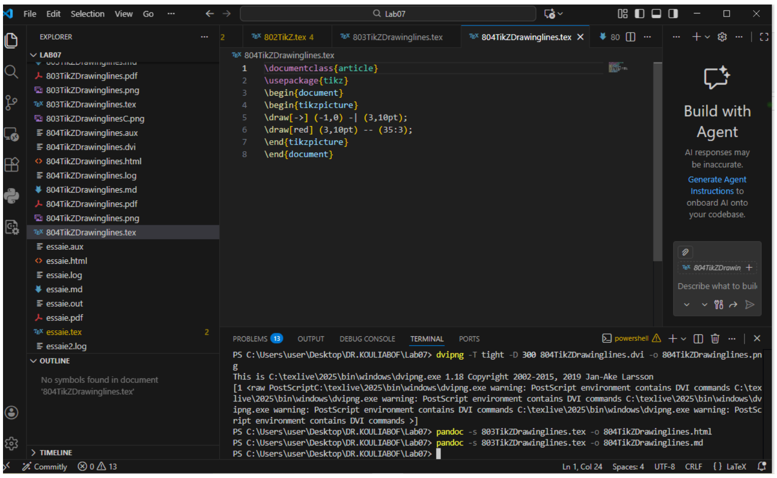
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\draw[->] (-1,0) -| (3,10pt);
\draw[red] (3,10pt) -- (35:3);
\end{tikzpicture}
\end{document}
```

Generated figure



Arrow + shortcut -| + red line

Screenshot



804TikZDrawinglines.tex

```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\draw[->] (-1,0) -| (3,10pt);
\draw[red] (3,10pt) -- (35:3);
\end{tikzpicture}
\end{document}
```

```
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> dvipng -T tight -D 300 804TikZDrawinglines.dvi -o 804TikZDrawinglines.pn
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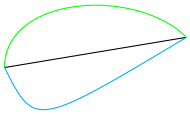
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> pandoc -s 803TikZDrawinglines.tex -o 804TikZDrawinglines.html
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> pandoc -s 803TikZDrawinglines.tex -o 804TikZDrawinglines.md
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07>
```

5 805TikZDrawinglines - Curves with controls

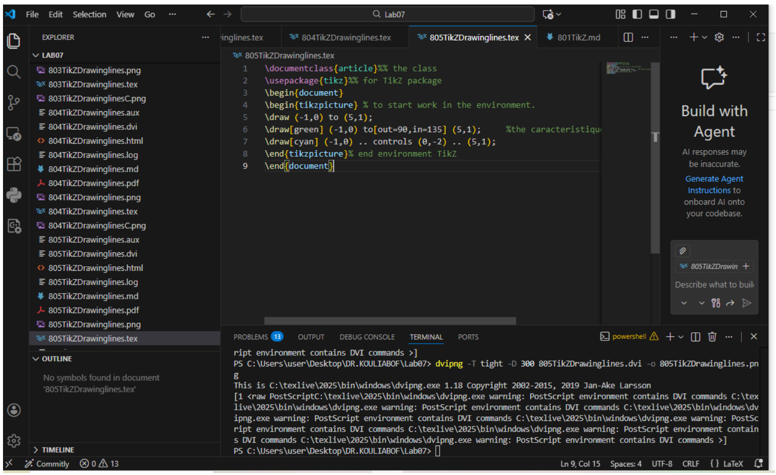
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\draw (-1,0) to (5,1);
\draw[green] (-1,0) to[out=90,in=135] (5,1);
\draw[cyan] (-1,0) .. controls (0,-2) .. (5,1);
\end{tikzpicture}
\end{document}
```

Generated figure



Straight line + curve with angles + Bézier with 1 control point

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture} % to start work in the environment.
\draw (-1,0) to (5,1);
\draw[green] (-1,0) to[out=90,in=135] (5,1);     %the caracteristiqu
\draw[cyan] (-1,0) .. controls (0,-2) .. (5,1);
\end{tikzpicture}% end environment TikZ
\end{document}
```

```
ript environment contains DVI commands >]
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> dvipng -T tight -D 300 805TikZDrawinglines.dvi -o 805TikZDrawinglines.pn
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PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> 
```

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805TikZDrawinglines.tex
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PROBLEMS 13 OUTPUT DEBUG CONSOLE TERMINAL PORTS
Build with Agent
AI responses may be inaccurate.
Generate Agent Instructions to onboard AI onto your codebase.
Describe what to buil
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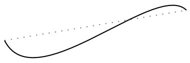
6 806TikZDrawinglines - Advanced curves

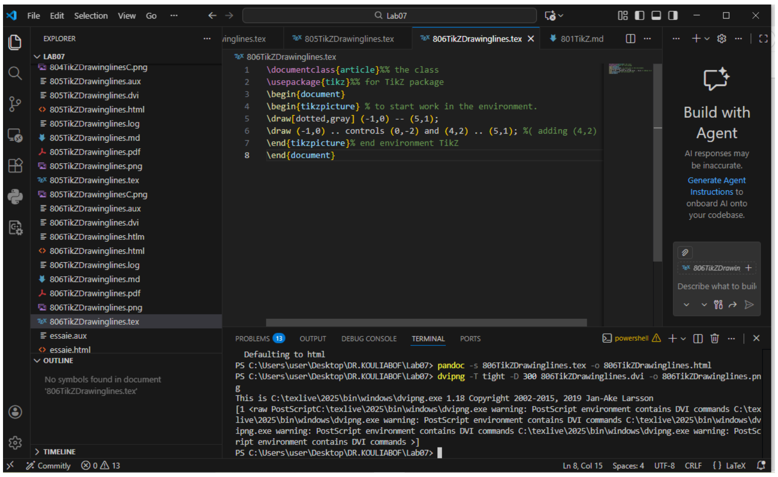
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\draw[dotted,gray] (-1,0) -- (5,1);
\draw (-1,0) .. controls (0,-2) and (4,2) .. (5,1);
\end{tikzpicture}
\end{document}
```

Generated figure



Dotted line + Bézier with 2 control points

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture} % to start work in the environment.
\draw[dotted,gray] (-1,0) -- (5,1);
\draw (-1,0) .. controls (0,-2) and (4,2) .. (5,1); %( adding (4,2)
\end{tikzpicture}% end environment TikZ
\end{document}
```

```
  Defaulting to html
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> pandoc -s 806TikZDrawinglines.tex -o 806TikZDrawinglines.html
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> dvipng -T tight -D 300 806TikZDrawinglines.dvi -o 806TikZDrawinglines.pn
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ript environment contains DVI commands >]
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> 
```

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806TikZDrawinglines.tex
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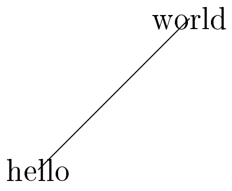
PROBLEMS 13 OUTPUT DEBUG CONSOLE TERMINAL PORTS
Build with Agent
AI responses may be inaccurate.
Generate Agent Instructions to onboard AI onto your codebase.
Describe what to buil
Ln 8, Col 15 Spaces: 4 UTF-8 CRLF { } LaTeX

7 810TikZNodes - Introduction to nodes

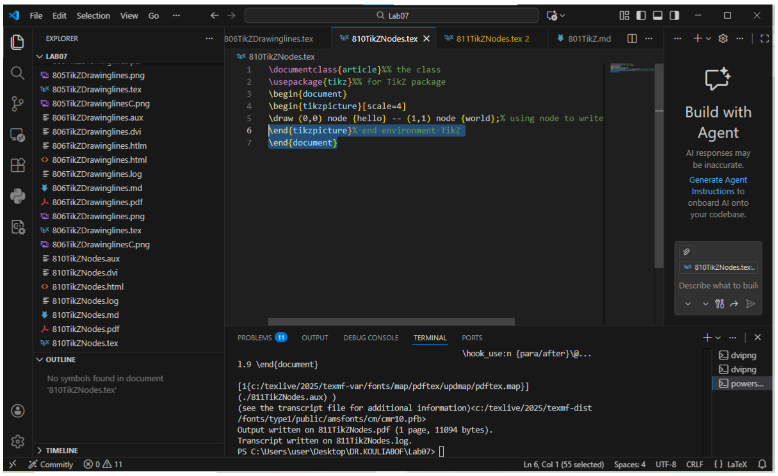
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}[scale=4]
\draw (0,0) node {hello} -- (1,1) node {world};
\end{tikzpicture}
\end{document}
```

Generated figure



Text nodes at endpoints

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}[scale=4]
\draw (0,0) node {hello} -- (1,1) node {world};% using node to write
\end{tikzpicture}% end environment TikZ
\end{document}
```

```
                                        \hook_use:n {para/after}\@...
l.9 \end{document}

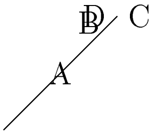
[1{c:/texlive/2025/texmf-var/fonts/map/pdftex/updmap/pdftex.map}]
(./811TikZNodes.aux) )
(see the transcript file for additional information)<c:/texlive/2025/texmf-dist
/fonts/type1/public/amsfonts/cm/cmr10.pfb>
Output written on 811TikZNodes.pdf (1 page, 11094 bytes).
Transcript written on 811TikZNodes.log.
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> 
```

8 811TikZNodes - Node positioning

```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}[scale=3]
\draw (0,0) -- (1,1) node[midway]{A} node[pos=0.75,above]{B} node[right]{C};
\draw (0,0) -- (1,1) node[left]{D};
```

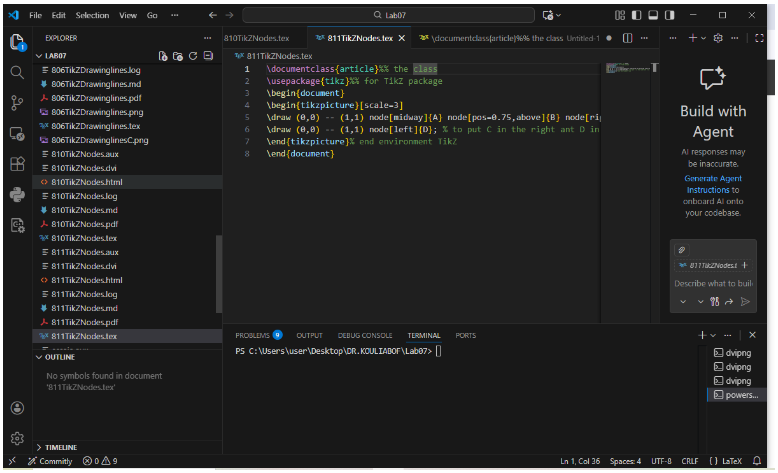
```
\end{tikzpicture}
\end{document}
```

Generated figure



Nodes at different positions

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}[scale=3]
\draw (0,0) -- (1,1) node[midway]{A} node[pos=0.75,above]{B} node[ri
\draw (0,0) -- (1,1) node[left]{D}; % to put C in the right ant D in
\end{tikzpicture}% end environment TikZ
\end{document}
```

AI responses may be inaccurate.

Generate Agent Instructions to onboard AI onto your codebase.

No symbols found in document '811TikZNodes.tex'

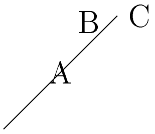
```
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07>
```

---

9 812TikZNodes - Nodes with 'to' command

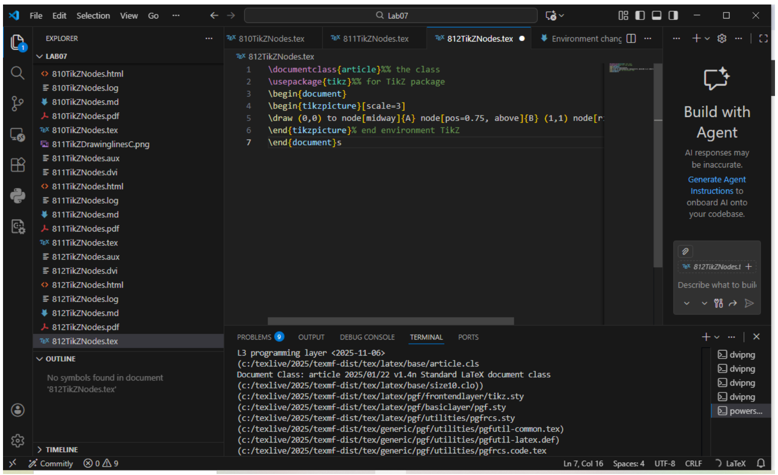
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}[scale=3]
\draw (0,0) to node[midway]{A} node[pos=0.75, above]{B} (1,1) node[right]{C};
\end{tikzpicture}
\end{document}
```

Generated figure



'to' command with nodes

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}[scale=3]
\draw (0,0) to node[midway]{A} node[pos=0.75, above]{B} (1,1) node[r
\end{tikzpicture}% end environment TikZ
\end{document}s
```

```
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Document Class: article 2025/01/22 v1.4n Standard LaTeX document class
(c:/texlive/2025/texmf-dist/tex/latex/base/size10.clo))
(c:/texlive/2025/texmf-dist/tex/latex/pgf/frontendlayer/tikz.sty
(c:/texlive/2025/texmf-dist/tex/latex/pgf/basiclayer/pgf.sty
(c:/texlive/2025/texmf-dist/tex/latex/pgf/utilities/pgfrcs.sty
(c:/texlive/2025/texmf-dist/tex/generic/pgf/utilities/pgfutil-common.tex)
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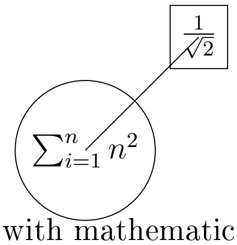
(c:/texlive/2025/texmf-dist/tex/generic/pgf/utilities/pgfrcs.code.tex
```

10 813TikZNodes.tex - Mathematical forms

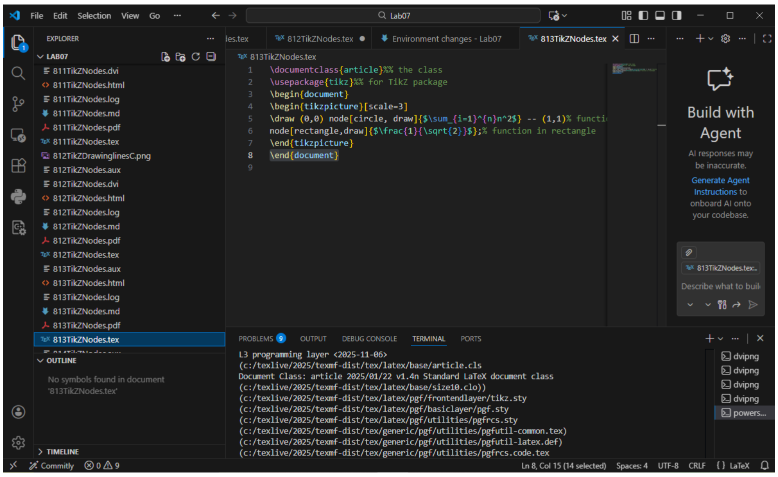
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}[scale=3]
\draw (0,0) node[circle, draw]{$\sum_{i=1}^{n}n^2$} -- (1,1)
node[rectangle,draw]{$\frac{1}{\sqrt{2}}$};
\end{tikzpicture}
\end{document}
```

Generated figure



Shapes with mathematical formulas

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}[scale=3]
\draw (0,0) node[circle, draw]{$\sum_{i=1}^{n}n^2$} -- (1,1)% functi
node[rectangle,draw]{$\frac{1}{\sqrt{2}}$};% function in rectangle
\end{tikzpicture}
\end{document}
```

```
L3 programming layer <2025-11-06>
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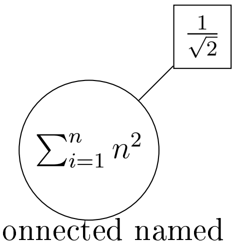
Document Class: article 2025/01/22 v1.4n Standard LaTeX document class
(c:/texlive/2025/texmf-dist/tex/latex/base/size10.clo))
(c:/texlive/2025/texmf-dist/tex/latex/pgf/frontendlayer/tikz.sty
(c:/texlive/2025/texmf-dist/tex/latex/pgf/basiclayer/pgf.sty
(c:/texlive/2025/texmf-dist/tex/latex/pgf/utilities/pgfrcs.sty
(c:/texlive/2025/texmf-dist/tex/generic/pgf/utilities/pgfutil-common.tex)
(c:/texlive/2025/texmf-dist/tex/generic/pgf/utilities/pgfutil-latex.def)
(c:/texlive/2025/texmf-dist/tex/generic/pgf/utilities/pgfrcs.code.tex
```

---

11 814TikZNodes - Named nodes

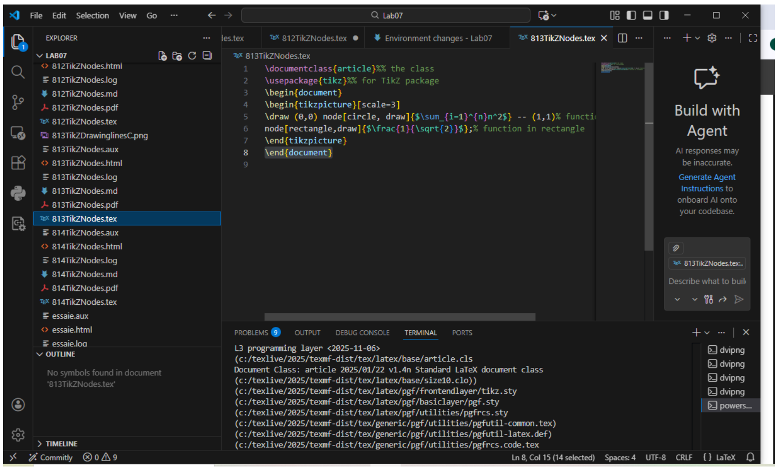
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}[scale=3]
\node[circle,draw] (label1) at (0,0) {$\sum_{i=1}^{n}n^2$};
\node[rectangle,draw] (label2) at (1,1) {$\frac{1}{\sqrt{2}}$};
\draw (label1) -- (label2);
\end{tikzpicture}
\end{document}
```

Generated figure



Connected named nodes

Screenshot



No symbols found in document '813TikZNodes.tex'

AI responses may be inaccurate.

Generate Agent Instructions to onboard AI onto your codebase.

```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}[scale=3]
\draw (0,0) node[circle, draw]{$\sum_{i=1}^{n}n^2$} -- (1,1)% functi
node[rectangle,draw]{$\frac{1}{\sqrt{2}}$};% function in rectangle
\end{tikzpicture}
\end{document}
```

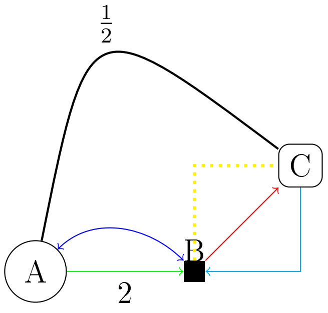
```
L3 programming layer <2025-11-06>
(c:/texlive/2025/texmf-dist/tex/latex/base/article.cls
Document Class: article 2025/01/22 v1.4n Standard LaTeX document class
(c:/texlive/2025/texmf-dist/tex/latex/base/size10.clo))
(c:/texlive/2025/texmf-dist/tex/latex/pgf/frontendlayer/tikz.sty
(c:/texlive/2025/texmf-dist/tex/latex/pgf/basiclayer/pgf.sty
(c:/texlive/2025/texmf-dist/tex/latex/pgf/utilities/pgfrcs.sty
(c:/texlive/2025/texmf-dist/tex/generic/pgf/utilities/pgfutil-common.tex)
(c:/texlive/2025/texmf-dist/tex/generic/pgf/utilities/pgfutil-latex.def)
(c:/texlive/2025/texmf-dist/tex/generic/pgf/utilities/pgfrcs.code.tex
```

12 815TikZNodesGenerateGraph - Complex graph

```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}[scale=2]
\node[circle, draw] at (0,0) (a) {A};
\node[rectangle, fill] at (3,0) (b) {};
\node at (3,0.4) (blabel) {B};
\node[rectangle,rounded corners, draw] at (5,2) (c) {C};

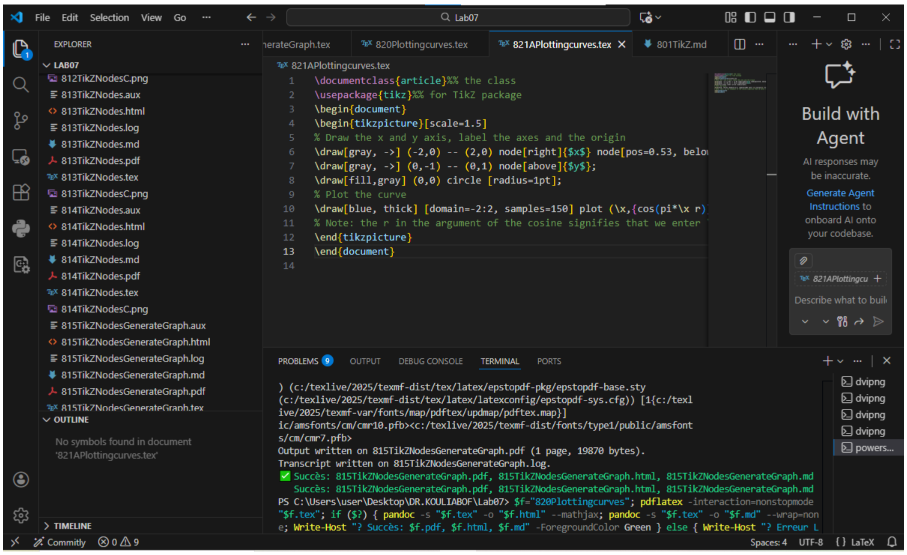
\draw[->, green] (a) -- (b) node[midway, below,black]{2};
\draw[<->, blue] (a) to[out=45, in=135] (b);
\draw[->,red] (b)--(c);
\draw[yellow,dotted,very thick] (b) |- (c);
\draw[<-,cyan] (b) -| (c);
\draw[thick,black] (a).. controls (1,5) .. (c)
    node[midway,above]{$\frac{1}{2}$};
\end{tikzpicture}
\end{document}
```

Generated figure



Multi-style complex graph

Screenshot



821APlottingcurves.tex

```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}[scale=1.5]
% Draw the x and y axis, label the axes and the origin
\draw[gray, ->] (-2,0) -- (2,0) node[right]{$x$} node[pos=0.53, belo
\draw[gray, ->] (0,-1) -- (0,1) node[above]{$y$};
\draw[fill,gray] (0,0) circle [radius=1pt];
% Plot the curve
\draw[blue, thick] [domain=-2:2, samples=150] plot (\x,{cos(pi*\x r)
% Note: the r in the argument of the cosine signifies that we enter
\end{tikzpicture}
\end{document}
```

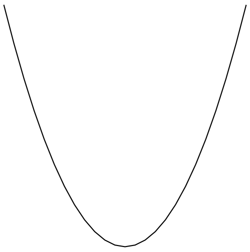
```
) (c:/texlive/2025/texmf-dist/tex/latex/epstopdf-pkg/epstopdf-base.sty
(c:/texlive/2025/texmf-dist/tex/latex/latexconfig/epstopdf-sys.cfg)) [1{c:/texl
ive/2025/texmf-var/fonts/map/pdftex/updmap/pdftex.map}]
ic/amsfonts/cm/cmr10.pfb><c:/texlive/2025/texmf-dist/fonts/type1/public/amsfont
s/cm/cmr7.pfb>
Output written on 815TikZNodesGenerateGraph.pdf (1 page, 19870 bytes).
Transcript written on 815TikZNodesGenerateGraph.log.
✅ Succès: 815TikZNodesGenerateGraph.pdf, 815TikZNodesGenerateGraph.html, 815TikZNodesGenerateGraph.md
   Succès: 815TikZNodesGenerateGraph.pdf, 815TikZNodesGenerateGraph.html, 815TikZNodesGenerateGraph.md
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> $f="820Plottingcurves"; pdflatex -interaction=nonstopmode
"$f.tex"; if ($?) { pandoc -s "$f.tex" -o "$f.html" --mathjax; pandoc -s "$f.tex" -o "$f.md" --wrap=non
e; Write-Host "? Succès: $f.pdf, $f.html, $f.md" -ForegroundColor Green } else { Write-Host "? Erreur L
```

---

13 820Plottingcurves - Simple curve plotting

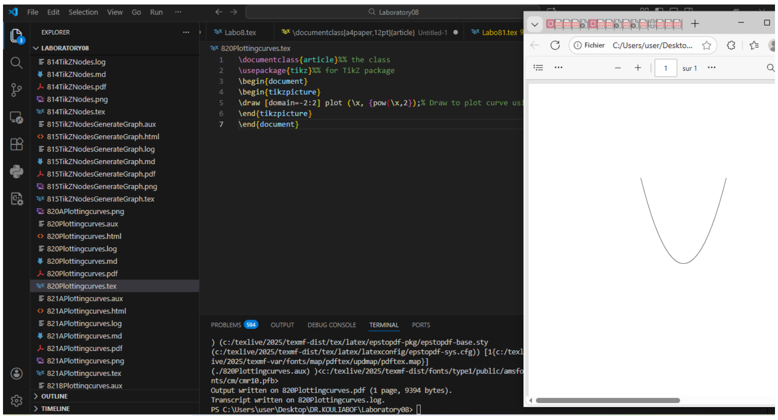
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\draw [domain=-2:2] plot (\x, {pow(\x,2)});
\end{tikzpicture}
\end{document}
```

Generated figure



Parabola $y = x^2$

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}
\draw [domain=-2:2] plot (\x, {pow(\x,2});% Draw to plot curve usi
\end{tikzpicture}
\end{document}
```

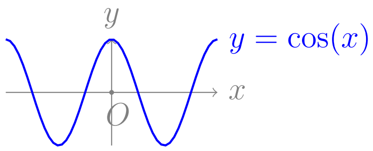
```
) (c:/texlive/2025/texmf-dist/tex/latex/epstopdf-pkg/epstopdf-base.sty
(c:/texlive/2025/texmf-dist/tex/latex/latexconfig/epstopdf-sys.cfg)) [1{c:/texl
ive/2025/texmf-var/fonts/map/pdftex/updmap/pdftex.map}]
(./820Plottingcurves.aux) )<c:/texlive/2025/texmf-dist/fonts/type1/public/amsfo
nts/cm/cmr10.pfb>
Output written on 820Plottingcurves.pdf (1 page, 9394 bytes).
Transcript written on 820Plottingcurves.log.
PS C:\Users\user\Desktop\DR.KOULIABOF\Laboratory08>
```

---

14 821APlottingcurves - Cosine with axes

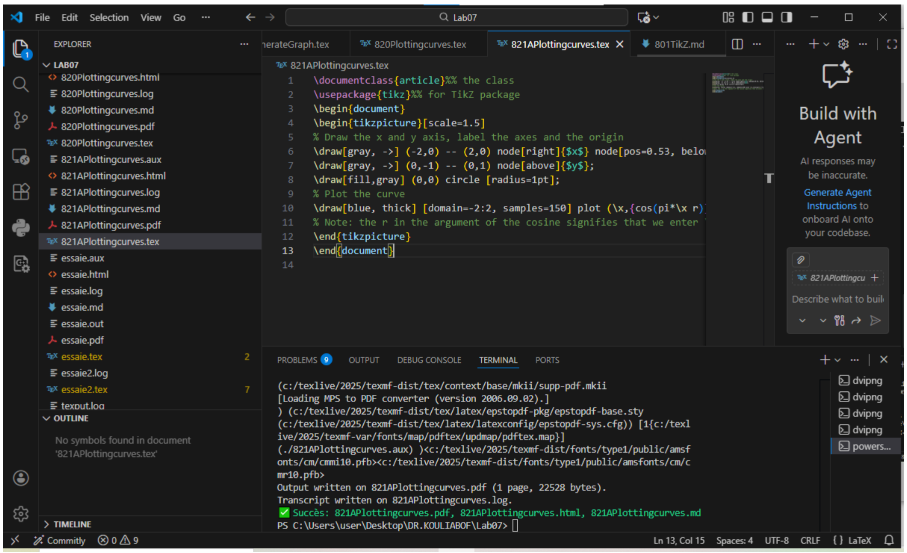
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}[scale=1.5]
\draw[gray, ->] (-2,0) -- (2,0) node[right]{$x$} node[pos=0.53, below]{$O$};
\draw[gray, ->] (0,-1) -- (0,1) node[above]{$y$};
\draw[fill,gray] (0,0) circle [radius=1pt];
\draw[blue, thick] [domain=-2:2, samples=50]
    plot (\x,{cos(pi*\x r)})
    node[right]{$y = \cos(x)$};
\end{tikzpicture}
\end{document}
```

Generated figure



Cosine function with axes

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}[scale=1.5]
% Draw the x and y axis, label the axes and the origin
\draw[gray, ->] (-2,0) -- (2,0) node[right]{$x$} node[pos=0.53, belo
\draw[gray, ->] (0,-1) -- (0,1) node[above]{$y$};
\draw[fill,gray] (0,0) circle [radius=1pt];
% Plot the curve
\draw[blue, thick] [domain=-2:2, samples=150] plot (\x,{cos(pi*\x r)
% Note: the r in the argument of the cosine signifies that we enter
\end{tikzpicture}
\end{document}
```

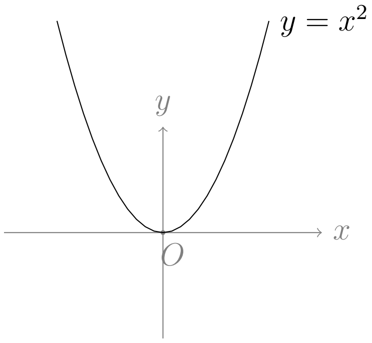
```
(c:/texlive/2025/texmf-dist/tex/context/base/mkii/supp-pdf.mkii
[Loading MPS to PDF converter (version 2006.09.02).]
) (c:/texlive/2025/texmf-dist/tex/latex/epstopdf-pkg/epstopdf-base.sty
(c:/texlive/2025/texmf-dist/tex/latex/latexconfig/epstopdf-sys.cfg)) [1{c:/texl
ive/2025/texmf-var/fonts/map/pdftex/updmap/pdftex.map}]
(./821APlottingcurves.aux) )<c:/texlive/2025/texmf-dist/fonts/type1/public/amsf
onts/cm/cmmi10.pfb><c:/texlive/2025/texmf-dist/fonts/type1/public/amsfonts/cm/c
mr10.pfb>
Output written on 821APlottingcurves.pdf (1 page, 22528 bytes).
Transcript written on 821APlottingcurves.log.
✅ Succès: 821APlottingcurves.pdf, 821APlottingcurves.html, 821APlottingcurves.md
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07> 
```

---

15 821BPlottingcurves - Parabola with axes

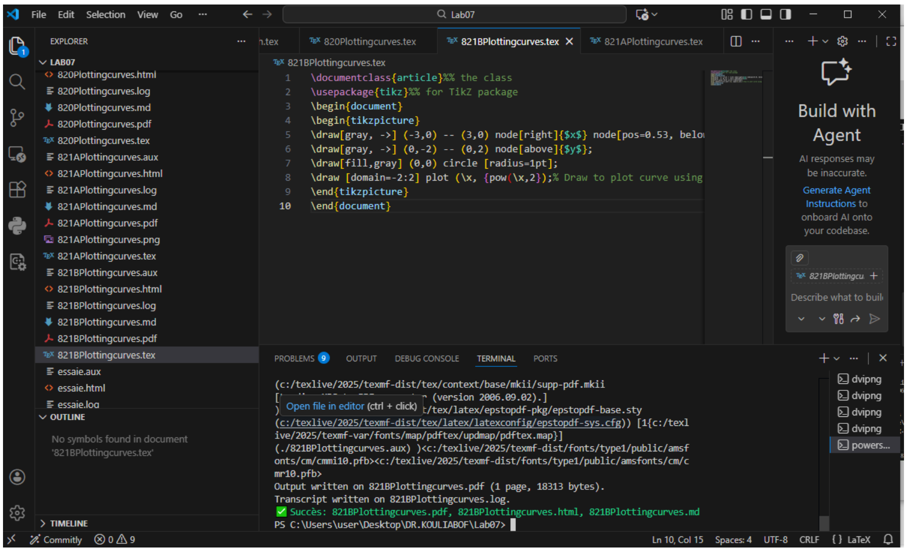
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\draw[gray, ->] (-3,0) -- (3,0) node[right]{$x$} node[pos=0.53, below]{$O$};
\draw[gray, ->] (0,-2) -- (0,2) node[above]{$y$};
\draw[fill,gray] (0,0) circle [radius=1pt];
\draw [domain=-2:2] plot (\x, {pow(\x,2)}) node[right] {$y = x^2$};
\end{tikzpicture}
\end{document}
```

Generated figure



Parabola with coordinate system

Screenshot



```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
\begin{tikzpicture}
\draw[gray, ->] (-3,0) -- (3,0) node[right]{$x$} node[pos=0.53, belo
\draw[gray, ->] (0,-2) -- (0,2) node[above]{$y$};
\draw[fill,gray] (0,0) circle [radius=1pt];
\draw [domain=-2:2] plot (\x, {pow(\x,2});% Draw to plot curve using
\end{tikzpicture}
\end{document}
```

Build with Agent

AI responses may be inaccurate.

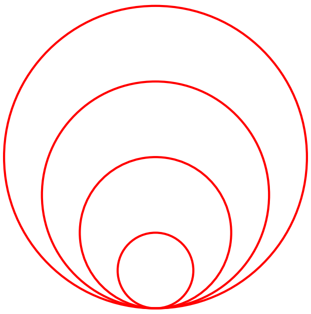
Generate Agent Instructions to onboard AI onto your codebase.

```
(c:/texlive/2025/texmf-dist/tex/context/base/mkii/supp-pdf.mkii
[                        r (version 2006.09.02).]
) Open file in editor (ctrl + click) t/tex/latex/epstopdf-pkg/epstopdf-base.sty
(c:/texlive/2025/texmf-dist/tex/latex/latexconfig/epstopdf-sys.cfg)) [1{c:/texl
ive/2025/texmf-var/fonts/map/pdftex/updmap/pdftex.map}]
(./821BPlottingcurves.aux) )<c:/texlive/2025/texmf-dist/fonts/type1/public/amsf
onts/cm/cmmi10.pfb><c:/texlive/2025/texmf-dist/fonts/type1/public/amsfonts/cm/c
mr10.pfb>
Output written on 821BPlottingcurves.pdf (1 page, 18313 bytes).
Transcript written on 821BPlottingcurves.log.
✅ Succès: 821BPlottingcurves.pdf, 821BPlottingcurves.html, 821BPlottingcurves.md
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07>
```

16 830TikZWorkingWithLoops - Simple loops

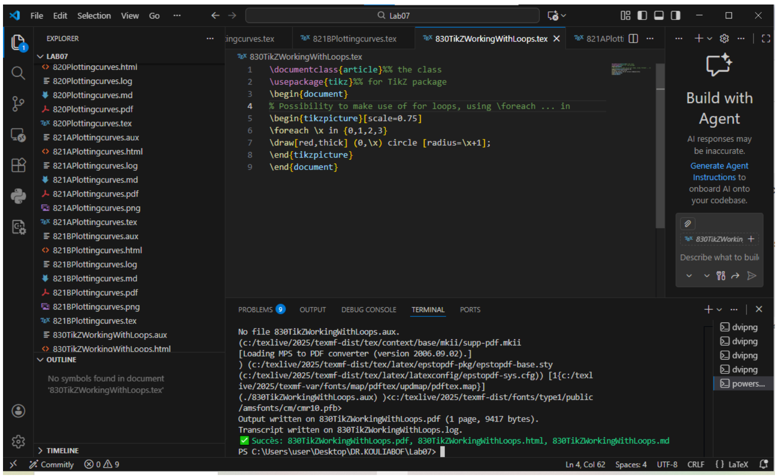
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}[scale=0.75]
\foreach \x in {0,1,2,3}
\draw[red,thick] (0,\x) circle [radius=\x+1];
\end{tikzpicture}
\end{document}
```

Generated figure



Concentric circles using loop

Screenshot



830TikZWorkingWithLoops.tex

```
\documentclass{article}%% the class
\usepackage{tikz}%% for TikZ package
\begin{document}
% Possibility to make use of for loops, using \foreach ... in
\begin{tikzpicture}[scale=0.75]
\foreach \x in {0,1,2,3}
\draw[red,thick] (0,\x) circle [radius=\x+1];
\end{tikzpicture}
\end{document}
```

```
No file 830TikZWorkingWithLoops.aux.
(c:/texlive/2025/texmf-dist/tex/context/base/mkii/supp-pdf.mkii
[Loading MPS to PDF converter (version 2006.09.02).]
) (c:/texlive/2025/texmf-dist/tex/latex/epstopdf-pkg/epstopdf-base.sty
(c:/texlive/2025/texmf-dist/tex/latex/latexconfig/epstopdf-sys.cfg)) [1{c:/texl
ive/2025/texmf-var/fonts/map/pdftex/updmap/pdftex.map}]
(./830TikZWorkingWithLoops.aux) )<c:/texlive/2025/texmf-dist/fonts/type1/public
/amsfonts/cm/cmr10.pfb>
Output written on 830TikZWorkingWithLoops.pdf (1 page, 9417 bytes).
Transcript written on 830TikZWorkingWithLoops.log.
✅ Succès: 830TikZWorkingWithLoops.pdf, 830TikZWorkingWithLoops.html, 830TikZWorkingWithLoops.md
PS C:\Users\user\Desktop\DR.KOULIABOF\Lab07>
```

---

17 831TikZWorkingWithLoopsSierpiński - Sierpiński triangle

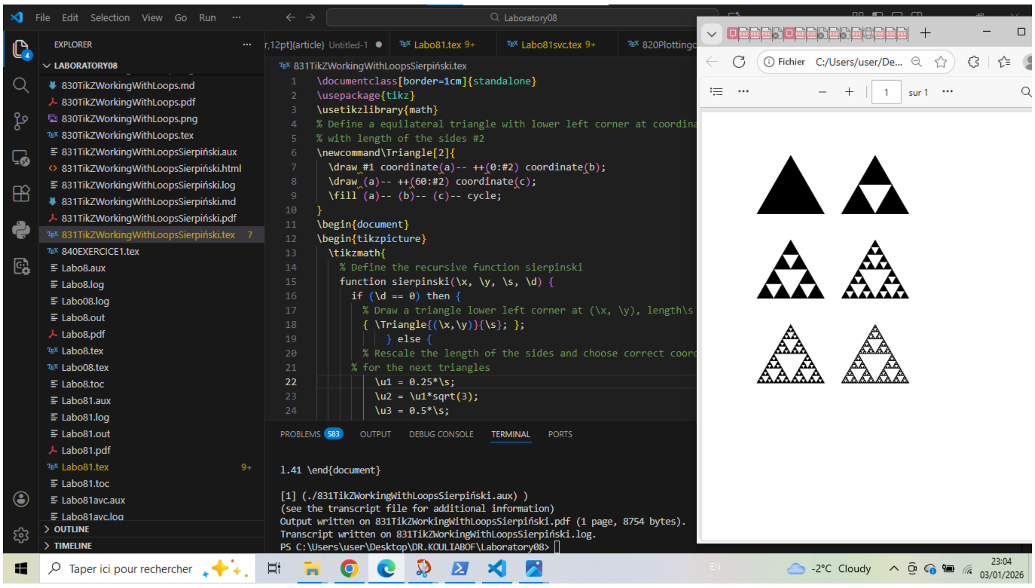
```
\documentclass[border=1cm]{standalone}
\usepackage{tikz}
\usetikzlibrary{math}

\newcommand\Triangle[2]{
  \draw #1 coordinate(a)-- ++(0:#2) coordinate(b);
  \draw (a)-- ++(60:#2) coordinate(c);
  \fill (a)-- (b)-- (c)-- cycle;
}

\begin{document}
\begin{tikzpicture}
  \tikzmath{
    function sierpinski(\x, \y, \s, \d) {
      if (\d == 0) then {
        { \Triangle{(\x,\y)}{\s}; };
      } else {
        \u1 = 0.25*\s;
        \u2 = \u1*sqrt(3);
        \u3 = 0.5*\s;
        sierpinski(\x,\y,\u3,\d-1);
        sierpinski(\x+\u3,\y,\u3,\d-1);
        sierpinski(\x+\u1,\y+\u2,\u3,\d-1);
      };
    };
 \S = 4;
    for \d in {0,...,5}{
      % To situate all plots nicely under and next to each other, define the coords
      % of the lower left corners preemptively
      \x = (\S+1)*mod(\d,2);
      \y = int(\d/2) * (\S+1);
      sierpinski(\x,-\y,\S,\d);
      };
  }
\end{tikzpicture}
\end{document}
```

Generated figure

Screenshot


File
Edit
Selection
View
Go
Run
Laboratory08
EXPLORER
LABORATORY08
830TikZWorkingWithLoops.md
830TikZWorkingWithLoops.pdf
830TikZWorkingWithLoops.png
830TikZWorkingWithLoops.tex
831TikZWorkingWithLoopsSierpiński.aux
831TikZWorkingWithLoopsSierpiński.html
831TikZWorkingWithLoopsSierpiński.log
831TikZWorkingWithLoopsSierpiński.md
831TikZWorkingWithLoopsSierpiński.pdf
831TikZWorkingWithLoopsSierpiński.tex 7
840EXERCICE1.tex
Labo8.aux
Labo8.log
Labo08.log
Labo8.out
Labo8.pdf
Labo8.tex
Labo08.tex
Labo8.toc
Labo81.aux
Labo81.log
Labo81.out
Labo81.pdf
Labo81.tex 9+
Labo81.toc
Labo81avc.aux
Labo81avc.log
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r,12pt]{article} Untitled-1
Labo81.tex 9+
Labo81svc.tex 9+
820Plotting
831TikZWorkingWithLoopsSierpiński.tex
PROBLEMS 583
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Fichier
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1
sur 1
Taper ici pour rechercher
-2°C Cloudy
23:04
03/01/2026

```
\documentclass[border=1cm]{standalone}
\usepackage{tikz}
\usetikzlibrary{math}
% Define a equilateral triangle with lower left corner at coordina
% with length of the sides #2
\newcommand\Triangle[2]{
  \draw #1 coordinate(a)-- ++(0:#2) coordinate(b);
  \draw (a)-- ++(60:#2) coordinate(c);
  \fill (a)-- (b)-- (c)-- cycle;
}
\begin{document}
\begin{tikzpicture}
  \tikzmath{
    % Define the recursive function sierpinski
    function sierpinski(\x, \y, \s, \d) {
      if (\d == 0) then {
        % Draw a triangle lower left corner at (\x, \y), length\s
        { \Triangle{(\x,\y)}{\s}; };
            } else {
        % Rescale the length of the sides and choose correct coor
      % for the next triangles
          \u1 = 0.25*\s;
          \u2 = \u1*sqrt(3);
          \u3 = 0.5*\s;
```

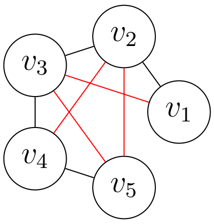
```
1.41 \end{document}

[1] (./831TikZWorkingWithLoopsSierpiński.aux) )
(see the transcript file for additional information)
Output written on 831TikZWorkingWithLoopsSierpiński.pdf (1 page, 8754 bytes).
Transcript written on 831TikZWorkingWithLoopsSierpiński.log.
PS C:\Users\user\Desktop\DR.KOULIABOF\Laboratory08>
```

18 840EXERCICE1 - Exercise: Pentagon

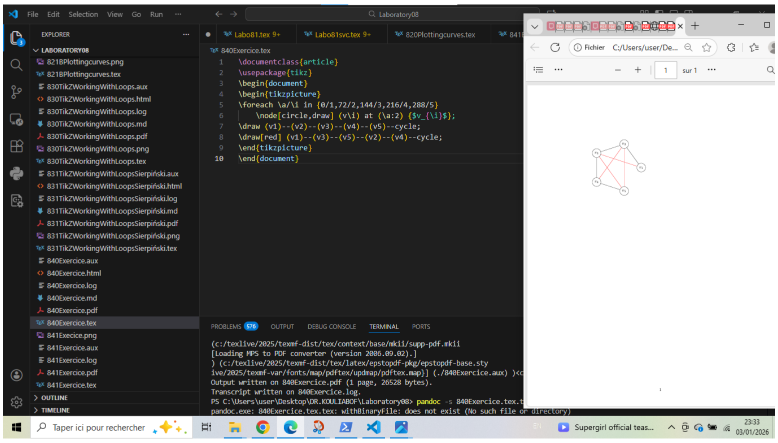
```
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\foreach \a/\i in {0/1,72/2,144/3,216/4,288/5}
    \node[circle,draw] (v\i) at (\a:2) {$v_{\i}$};
\draw (v1)--(v2)--(v3)--(v4)--(v5)--cycle;
\draw[red] (v1)--(v3)--(v5)--(v2)--(v4)--cycle;
\end{tikzpicture}
\end{document}
```

Generated figure



Regular pentagon with diagonals

Screenshot


File
Edit
Selection
View
Go
Run
Laboratory08
EXPLORER
LABORATORY08
821BPlottingcurves.png
821BPlottingcurves.tex
830TikZWorkingWithLoops.aux
830TikZWorkingWithLoops.html
830TikZWorkingWithLoops.log
830TikZWorkingWithLoops.md
830TikZWorkingWithLoops.pdf
830TikZWorkingWithLoops.png
830TikZWorkingWithLoops.tex
831TikZWorkingWithLoopsSierpiński.aux
831TikZWorkingWithLoopsSierpiński.html
831TikZWorkingWithLoopsSierpiński.log
831TikZWorkingWithLoopsSierpiński.md
831TikZWorkingWithLoopsSierpiński.pdf
831TikZWorkingWithLoopsSierpiński.png
831TikZWorkingWithLoopsSierpiński.tex
840Exercice.aux
840Exercice.html
840Exercice.log
840Exercice.md
840Exercice.pdf
840Exercice.tex
841Execice.png
841Exercice.aux
841Exercice.log
841Exercice.pdf
841Exercice.tex
OUTLINE
TIMELINE
Labo81.tex 9+
Labo81svc.tex 9+
820Plottingcurves.tex
840Exercice.tex
PROBLEMS 576
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Taper ici pour rechercher
Supergirl official teas...
23:33
03/01/2026

```latex
\documentclass{article}
\usepackage{tikz}
\begin{document}
\begin{tikzpicture}
\foreach \a/\i in {0/1,72/2,144/3,216/4,288/5}
    \node[circle,draw] (v\i) at (\a:2) {$v_{\i}$};
\draw (v1)--(v2)--(v3)--(v4)--(v5)--cycle;
\draw[red] (v1)--(v3)--(v5)--(v2)--(v4)--cycle;
\end{tikzpicture}
\end{document}
```

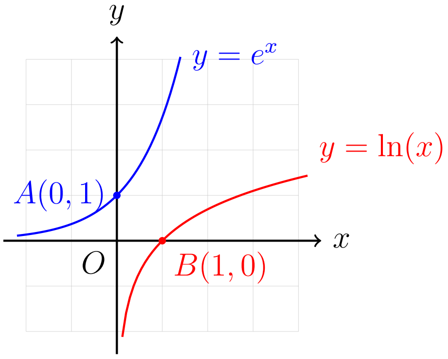
```
(c:/texlive/2025/texmf-dist/tex/context/base/mkii/supp-pdf.mkii
[Loading MPS to PDF converter (version 2006.09.02).]
) (c:/texlive/2025/texmf-dist/tex/latex/epstopdf-pkg/epstopdf-base.sty
ive/2025/texmf-var/fonts/map/pdftex/updmap/pdftex.map}] (./840Exercice.aux) )<c
Output written on 840Exercice.pdf (1 page, 26528 bytes).
Transcript written on 840Exercice.log.
PS C:\Users\user\Desktop\DR.KOULIABOF\Laboratory08> pandoc -s 840Exercice.tex.t
pandoc.exe: 840Exercice.tex.tex: withBinaryFile: does not exist (No such file or directory)
```

---

19 841EXERCICE - Exponential and logarithmic functions

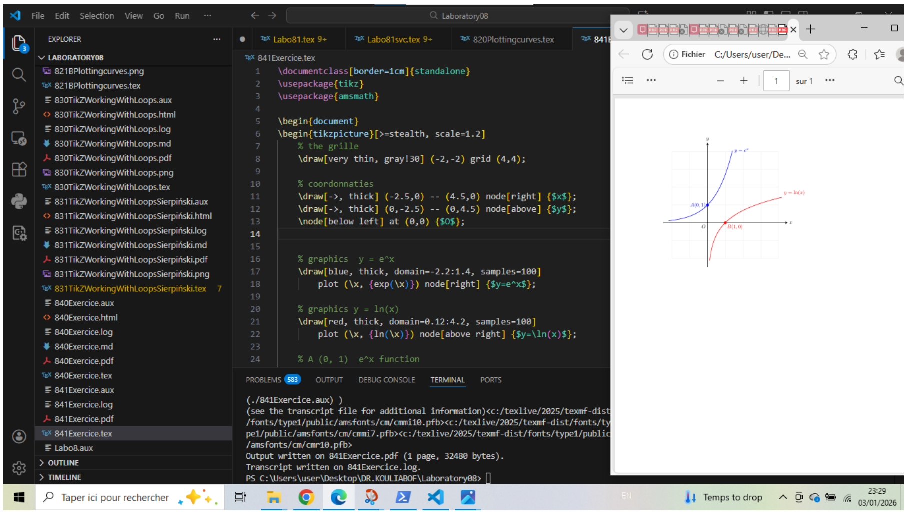
```latex
\documentclass[border=1cm]{standalone}
\usepackage{tikz}
\usepackage{amsmath}
\begin{document}
\begin{tikzpicture}[>=stealth, scale=1.2]
    \draw[very thin, gray!30] (-2,-2) grid (4,4);
    \draw[->, thick] (-2.5,0) -- (4.5,0) node[right] {$x$};
    \draw[->, thick] (0,-2.5) -- (0,4.5) node[above] {$y$};
    \node[below left] at (0,0) {$0$};
    \draw[blue, thick, domain=-2.2:1.4, samples=50]
        plot (\x, {exp(\x)}) node[right] {$y=e^x$};
    \draw[red, thick, domain=0.12:4.2, samples=50]
        plot (\x, {ln(\x)}) node[above right] {$y=\ln(x)$};
    \filldraw[blue] (0,1) circle (2pt);
    \node[left, blue] at (0,1) {$A(0,1)$};
    \filldraw[red] (1,0) circle (2pt);
    \node[below right, red] at (1,0) {$B(1,0)$};
\end{tikzpicture}
\end{document}
```

Generated figure



e^x and $\ln(x)$ symmetric about $y = x$

Screenshot



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```
\documentclass[border=1cm]{standalone}
\usepackage{tikz}
\usepackage{amsmath}

\begin{document}
\begin{tikzpicture}[>=stealth, scale=1.2]
    % the grille
    \draw[very thin, gray!30] (-2,-2) grid (4,4);

    % coordonnaties
    \draw[->, thick] (-2.5,0) -- (4.5,0) node[right] {$x$};
    \draw[->, thick] (0,-2.5) -- (0,4.5) node[above] {$y$};
    \node[below left] at (0,0) {$O$};


    % graphics  y = e^x
    \draw[blue, thick, domain=-2.2:1.4, samples=100]
        plot (\x, {exp(\x)}) node[right] {$y=e^x$};

    % graphics y = ln(x)
    \draw[red, thick, domain=0.12:4.2, samples=100]
        plot (\x, {ln(\x)}) node[above right] {$y=\ln(x)$};

    % A (0, 1)  e^x function
```

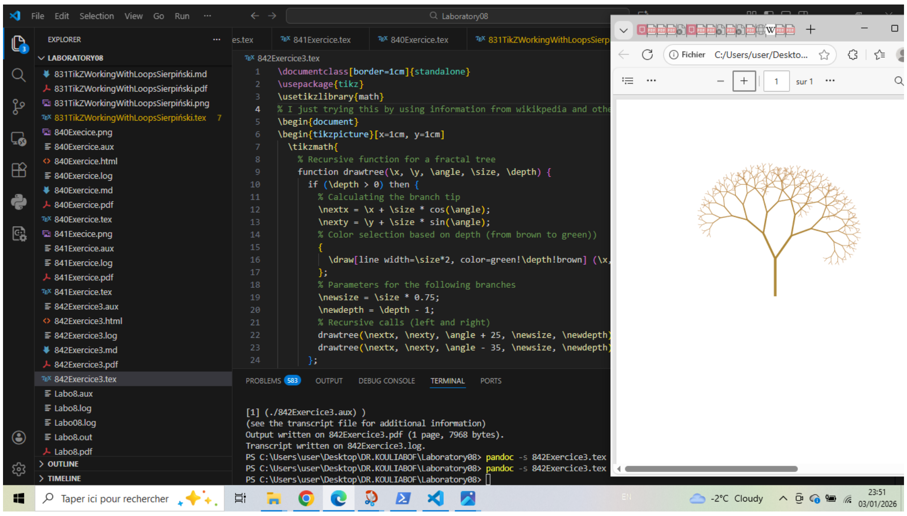
```
(./841Exercice.aux) )
(see the transcript file for additional information)<c:/texlive/2025/texmf-dist
/fonts/type1/public/amsfonts/cm/cmmi10.pfb><c:/texlive/2025/texmf-dist/fonts/ty
pe1/public/amsfonts/cm/cmmi7.pfb><c:/texlive/2025/texmf-dist/fonts/type1/public
/amsfonts/cm/cmr10.pfb>
Output written on 841Exercice.pdf (1 page, 32480 bytes).
Transcript written on 841Exercice.log.
PS C:\Users\user\Desktop\DR.KOULIABOF\Laboratory08>
```

20 842EXERCICE3 - Fractal tree

```
\documentclass[border=1cm]{standalone}
\usepackage{tikz}
\usetikzlibrary{math}
\begin{document}
\begin{tikzpicture}[x=1cm, y=1cm]
  \tikzmath{
    function drawtree(\x, \y, \angle, \size, \depth) {
      if (\depth > 0) then {
        \nextx = \x + \size * cos(\angle);
        \nexty = \y + \size * sin(\angle);
        {
          \draw[line width=\size*2, color=green!\depth!brown]
            (\x, \y) -- (\nextx, \nexty);
        };
        \newsize = \size * 0.75;
    \newdepth = \depth - 1;
    drawtree(\nextx, \nexty, \angle + 25, \newsize, \newdepth);
    drawtree(\nextx, \nexty, \angle - 35, \newsize, \newdepth);
   };
  };
  drawtree(0, 0, 90, 1.5, 9);
 }
\end{tikzpicture}
\end{document}
```

Generated figure

Screenshot



```
\documentclass[border=1cm]{standalone}
\usepackage{tikz}
\usetikzlibrary{math}
% I just trying this by using information from wikikpedia and othe
\begin{document}
\begin{tikzpicture}[x=1cm, y=1cm]
  \tikzmath{
    % Recursive function for a fractal tree
    function drawtree(\x, \y, \angle, \size, \depth) {
      if (\depth > 0) then {
        % Calculating the branch tip
        \nextx = \x + \size * cos(\angle);
        \nexty = \y + \size * sin(\angle);
        % Color selection based on depth (from brown to green))
        {
          \draw[line width=\size*2, color=green!\depth!brown] (\x,
        };
        % Parameters for the following branches
        \newsize = \size * 0.75;
        \newdepth = \depth - 1;
        % Recursive calls (left and right)
        drawtree(\nextx, \nexty, \angle + 25, \newsize, \newdepth)
        drawtree(\nextx, \nexty, \angle - 35, \newsize, \newdepth)
      };
```

```
[1] (./842Exercice3.aux) )
(see the transcript file for additional information)
Output written on 842Exercice3.pdf (1 page, 7968 bytes).
Transcript written on 842Exercice3.log.
PS C:\Users\user\Desktop\DR.KOULIABOF\Laboratory08> pandoc -s 842Exercice3.tex
PS C:\Users\user\Desktop\DR.KOULIABOF\Laboratory08> pandoc -s 842Exercice3.tex
PS C:\Users\user\Desktop\DR.KOULIABOF\Laboratory08>
```

Conclusion: Methodology for creating successful TikZ documents

After exhaustive study of TikZ examples, here is the structured methodology for creating successful TikZ documents:

1. Essential basic structure

```
\documentclass{article}  % or standalone for figures only
\usepackage{tikz}        % REQUIRED first
\usepackage{amsmath}     % For mathematical formulas
% Other packages as needed
\begin{document}
\begin{tikzpicture}[options]
 % Your TikZ code here
\end{tikzpicture}
\end{document}
```

2. Recommended progressive approach

Step 1: Planning

- Define dimensions (min/max coordinates)
- Identify graphical elements (lines, shapes, text)
- Choose appropriate scale

Step 2: Build in layers

1. Reference grid (`draw[gray, thin] (0,-8) grid (5,5);`)
2. Axes and reference marks
3. Main elements
4. Details and annotations
5. Legends and text

Step 3: Optimize

- Use custom styles: `\tikzset{monstyle/.style={red, thick}}`
- Define reusable nodes
- Organize with relative coordinates

3. Essential best practices

Practice	Example
Comment code	`% X-axis`
Name nodes	`(A) at (0,0)`
Use loops	`\foreach` for repetitions
Separate style/content	Styles in preamble, drawing in tikzpicture
Test frequently	Compile often to detect errors

4. Synthetic conclusion

To create successful TikZ documents:

1. **Structure**: Preamble → Environment → Commands → Closure
2. **Iterate**: Simple → Complex, Grid → Axes → Shapes → Details
3. **Optimize**: Styles, Loops, Named nodes
4. **Verify**: Semicolons, Names, Scale
5. **Document**: Comments, Separate files, Notes

Final reminder: TikZ is a powerful tool requiring practice. Always start with simple examples, gradually increase complexity, and don't hesitate to break down complex figures into several independent `tikzpicture` environments.