Ti*k*Z commends tutorial

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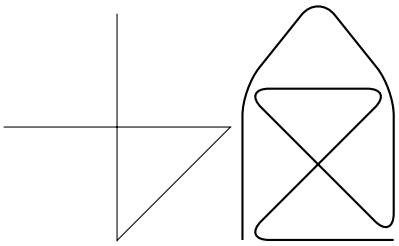
January 4, 2018

The Ti*k*Z commands can be inside the environment \begin{tikzpicture} . . . \end{tikzpicture} or simply use \tikz clause. We run pdflatex or latex followed by dvips to execute the Ti*k*Z commends.

1 Preliminary

1.1 Straight Path Construction

```
Useage:
  \draw[options] (x1,y1) -- (x2,y2) -- (x3,y3);

Example:
  \draw (-1.5,0) -- (1.5,0) -- (0,-1.5) -- (0,1.5);
  \draw[thick, rounded corners=10pt]
    (0,0) -- (0,2) -- (1,3.25) -- (2,2) -- (2,0) -- (0,2) -- (2,2) -- (0,0) -- (2,0);
```

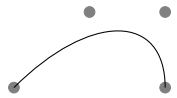


1.2 Circle Path Construction

```
Usage:
  \draw[options] (x,y) circle (raidus);
  \draw[options] (x,y) ellipse (x.raidus anda y.radius);

Example:
  \draw (0,0) circle (2pt);
  \draw[red] (1,0) circle (3pt);
  \draw[fill=red] (2,0) circle (4pt);
  \draw[red,fill=red] (3,0) ellipse (10pt and 5pt);
  \filldraw[blue,rotate=30] (3.5,-2) ellipse (10pt and 5pt);
```

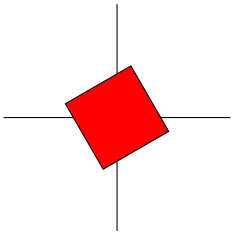
1.3 Curved Path Construction

```
Usage:
  \draw[options] (x1,y1) .. controls (x2,y2) and (x3,y3) .. (x4,y4)

Example:
  \filldraw[gray] (0,0) circle (2pt) (1,1) circle (2pt)
                  (2,1) circle (2pt) (2,0) circle (2pt);
  \draw (0,0) .. controls (1,1) and (2,1) .. (2,0);
```



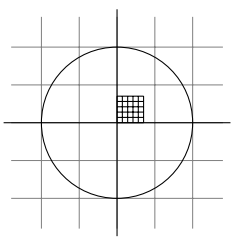
1.4 Rectangle Path Construction

```
Usage:
  \draw[options] (x1,y1) rectangle (x2,y2);

Example:
  \draw (-1.5,0) -- (1.5,0);
  \draw (0,-1.5) -- (0,1.5);
  \draw[rotate=30, fill=red] (-0.5,-0.5) rectangle (-1,-1);
```



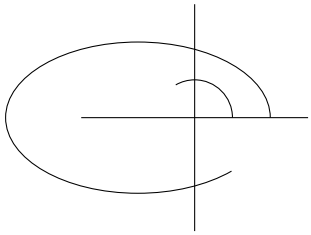
1.5 Grid Path Construction

```
Usage:
  \draw[options] (x1,y1) grid (x2,y2);

Example:
  \draw[step=.5cm, gray, very thin] (-1.4,-1.4) grid (1.4,1.4);
  \draw (-1.5,0) -- (1.5,0);
  \draw (0,-1.5) -- (0,1.5);
  \draw (0,0) circle (1cm);
  \draw[step=2pt] (0,0) grid (10pt,10pt);
```



1.6 Arc Path Construction

```
Usage:
  \draw (x,y) arc (angle1:angle2:radius)
  \draw (x,y) arc (angle1:angle2:x.radius and y.radius)

Example:
  \draw (-1.5,0) -- (1.5,0);
  \draw (0,-1.5) -- (0,1.5);
  \draw (0.5,0) arc (0:120:0.5cm);
  \draw (1,0) arc (0:315:1.75cm and 1cm);
```



1.7 Drawing Options

There are some drawing options that one can use to control the color, thickness, and line type.

- color: blue, black, brown, cyan, gray, green, lightgray, lime, magenta, orange, pink, purple, red, yellow, teal, violet, white.
- thickness: ultra thin, very thin, thin, semithick, thick, very thick, ultra thick.
- line type: loosely dashed, dashed, densely dashed, loosely dotted, dotted, densely dotted.

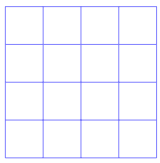
```
Usage:
  \draw[color, thickness, line type] (x1,y1) -- (x2,y2);

Example:
  \draw[red, very thin, densely dashed] (0,0) -- (0.9,0);
  \draw[blue, ultra thick, loosely dotted] (1.1,0) -- (2,0);
  \draw[green, semithick] (2.1,0) -- (2.9,0);
```


1.8 Adding a Touch Style

Styles are predefined sets of options that can be used to organize how a graphic is drawn. To define a style globally, we can use the \tikzset command at the beginning of the document.

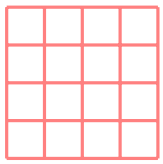
```
Usage:
  \tikzset{style_name./style={options}}

Example:
  \tikzset{blue_thin_lines/.style={color=blue!50,very thin}}
```

```
\begin{tikzpicture}
  \draw[blue_thin_lines] (0,0) grid (5,5);
\end{tikzpicture}
```



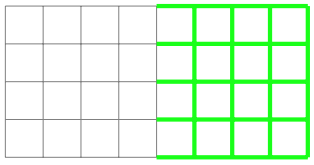
To define a style locally, we use a pair of square bracket "[ ]" to define styles at the beginning of a picture.

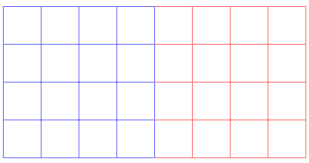
```
Usage:
  [style_name/.style={options}]

Example:
  \begin{tikzpicture}
    [red_thick_lines/.style={color=red!50,very thick}]
    \draw[step=0.5cm, red_thick_lines] (0,0) grid (2,2);
  \end{tikzpicture}
```



One can also define styles hierarchically.

```
Usage:
  \tikzset{style_name1/.style={style_name2, options}}

Example:
  \tikzset{green_help_lines/.style={help lines, color=green!90}}
  \begin{tikzpicture}
    \draw[step=0.5cm, green_help_lines] (0,0) grid (5,5);
  \end{tikzpicture}
```



Styles can also be used with a parameter.

```
Usage:
  [style_name/.style={options}, style_name/.default={options}]

Example:
  \begin{tikzpicture}
    [para_color/.style={help lines,color=#1!50}, para_color/.default=blue]
    \draw[step=0.5cm, para_color] (0,0) grid (2,2);
    \draw[step=0.5cm, para_color=red] (2,0) grid (4,2);
  \end{tikzpicture}
```