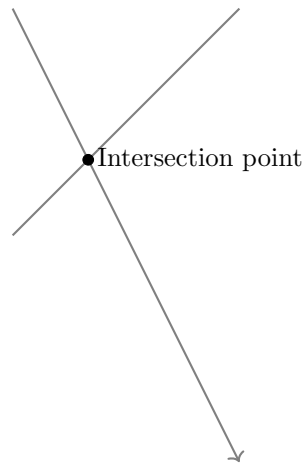# LaTeX Experiments
Part III: PGF/TikZ

AeAeA

January 29, 2020

1 TikZ ist *kein* Zeichenprogramm

Für meinen Vater, damit er noch viele schöne
*TEX-Graphiken erschaffen kann.*

— Till Tantau

- https://en.wikipedia.org/wiki/PGF/TikZ

- https://www.ctan.org/pkg/pgf

- https://github.com/pgf-tikz/pgf

- Minimal introduction to TikZ (unofficial)

- It comes with very good documentation; the version 3.1.5b of the PGF Manual has over 1,300 pages (!) ...

- ...and an extensive collection of examples: http://www.texample.net/tikz/

- `https://en.wikibooks.org/wiki/LaTeX/PGF/TikZ`

- `https://www.overleaf.com/learn/latex/TikZ_package`
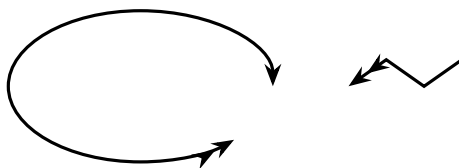
1.1 Basic elements: points, lines and paths
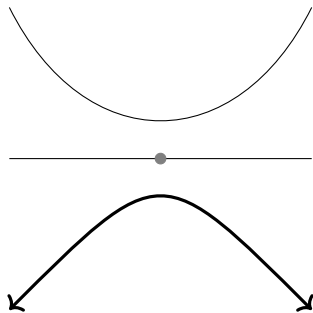
1.2 Basic geometric shapes: Circles, ellipses and polygons
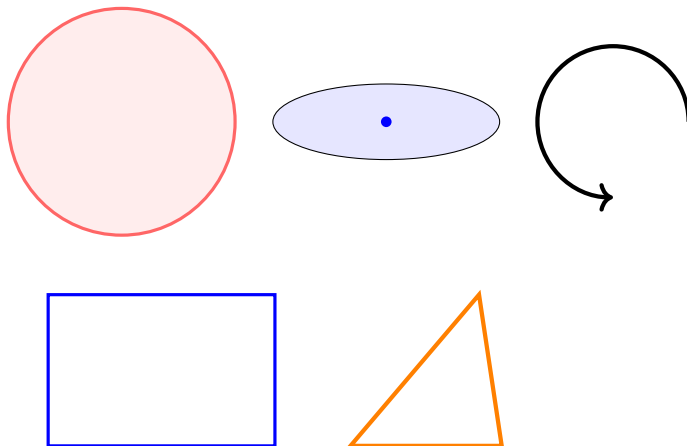
The code for the little "turned" ellipse ⬭ is

```
\tikz \draw[rotate=30] (0,0) ellipse [x radius=6pt,y radius=3pt];
```
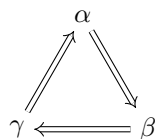
1.3 Elliptical arc

1.4 Arrow tips

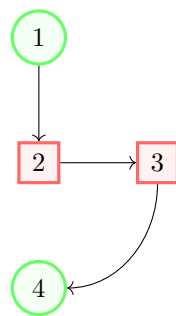↑ᴛᴛ | ⬤♦⬤ | | | ↑ | ♦▲▲↑✳❚ | ⬛▲↑ᴛ↑♠ | ♦

1.4.1 Arrow Tip Kind `Implies`

This arrow tip makes only sense in conjunction with the double option: attach it to a double line to get something ($\implies$) that looks like `amsmath` T$_{\text{E}}$X's `\implies` arrow ($\implies$). A typical use of this arrow tip is:
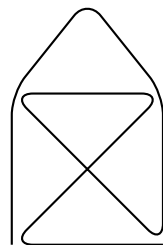
$$\therefore \quad e_l * e_r \implies e_r$$
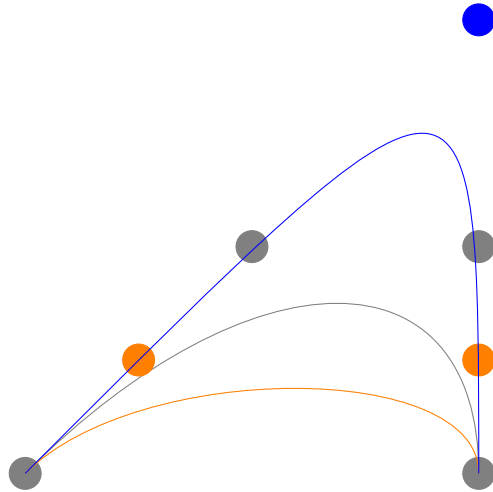
1.5 Diagrams with nodes

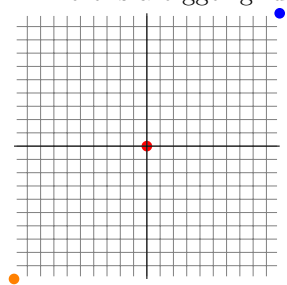### 1.5.1 Extracting Insights From Data diagram
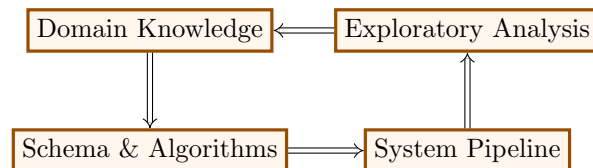
1.6 Path

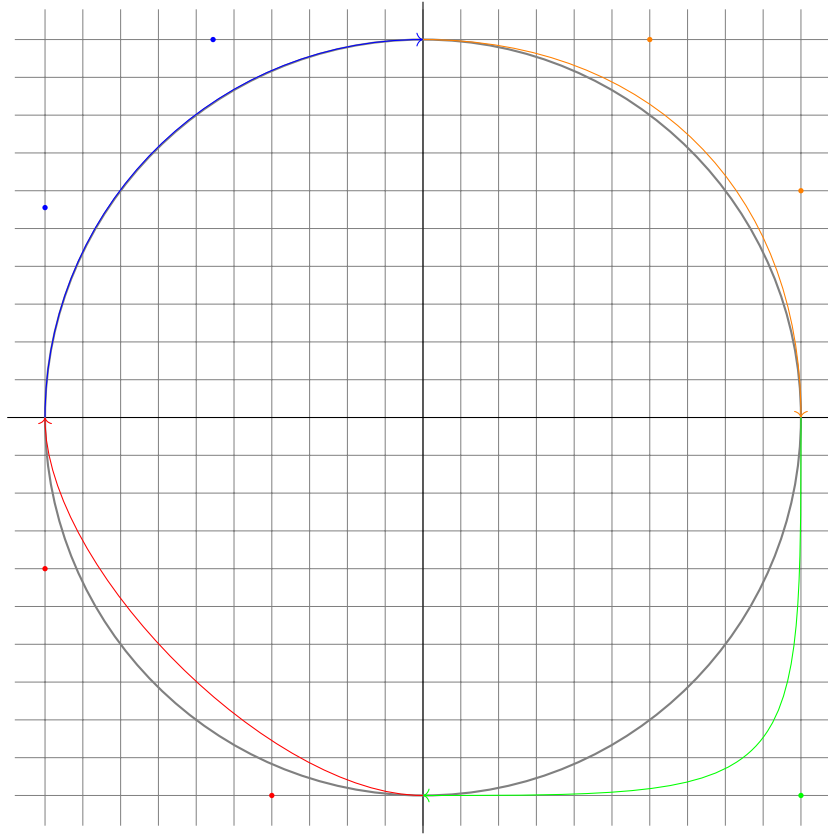## 1.7   Curved path

1.8   Grid

The code `\tikz \draw[step=2pt] (0,0) grid (10pt,10pt);` produces ▦.
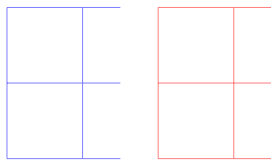Here is a bigger grid:

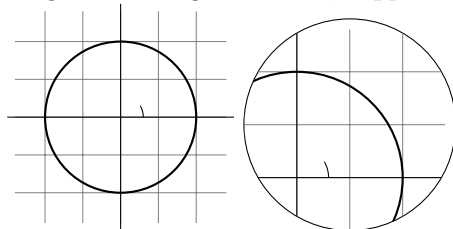## 1.9   Circle and curved path

0.555 is the magic number.

1.10   Style

1.11 Clipping a path

Original drawing on the left, clipped drawing on the right:

1.12 Parabola and Sine

Two parabolas ▽ and a parabola with placed bend ▽

A parabola with the bend: ⌐

A sine ⁄ curve, and a longer span of sine and cosine: ∿

1.13 Closing the path

The `--cycle` causes the current path to be closed (actually the current part of the current path) by smoothly joining the first and last point. To appreciate the difference, consider the following example:

1.14 Shading

The default shading is a smooth transition from gray at the top to white at the bottom:
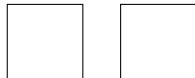
To specify different colors, you can use options:

1.15 Scoping

1.16   Specifying Coordinates

To appreciate the difference between + and ++ consider the following example:
```
-- ++(1cm,0cm)  -- ++(0cm,1cm)  -- ++(-1cm,0cm) -- cycle
```

By comparison, when using a single +, the coordinates are different:
```
-- +(1cm,0cm)  -- +(1cm,1cm)  -- +(0cm,1cm) -- cycle
```

1.17   Transformations

Another way to display all options for arrow tips: