1 Venn diagrams

```
\usetikzlibrary{venn}
```

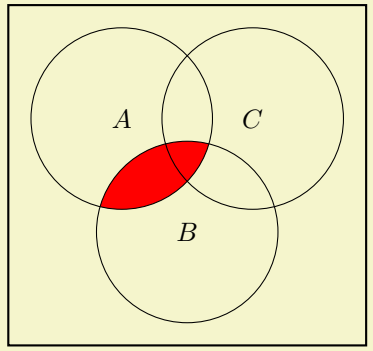
1.1 Basic options

The `venn` library has some options and styles for drawing Venn diagrams.

`/tikz/cs/Venn diagram` (no value)

Installs a basic Venn diagram along with the `\Venn` macro.

The macro `\Venn` allows one to draw intersections, unions and on. The character `n` stands for ∩, i.e. an intersection, and `u` for ∪, i.e. a union.




```
\begin{tikzpicture}[Venn diagram]
 \Venn{AnB}
\end{tikzpicture}
```

The most basic parameters are listed next.

`/tikz/venn/style` (initially `fill=red`)

The fill style of the sets.

`/tikz/venn/frame` (initially `thick`)

Style of the frame.

`/tikz/venn/frame margin` (initially `3mm`)

Distance between the frame and the sets.

`/tikz/venn/radius` (initially `1.2cm`)

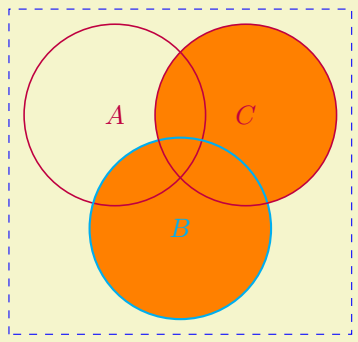
Radius of the circles.

`/tikz/venn/radius` (initially `1.2cm`)

Radius of the circles.

`/tikz/venn/lines` (initially `thin`)

Style of the circles.

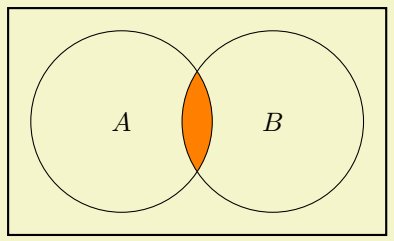



```
\begin{tikzpicture}[Venn diagram={
style={fill=orange},
frame/.style={blue,dashed},
frame margin=2mm,
lines/.style={purple,semithick},
circle B/.style={cyan,thick}}]
 \Venn{CuB}
\end{tikzpicture}
```

As one can see, it is possible to give circles their individual styles. Whether or not this is a good idea is another question. Note also that there is no precaution taken for the case that a user changes the distance too large such that the circles do not intersect.

`/tikz/venn/number of sets` (initially 3)

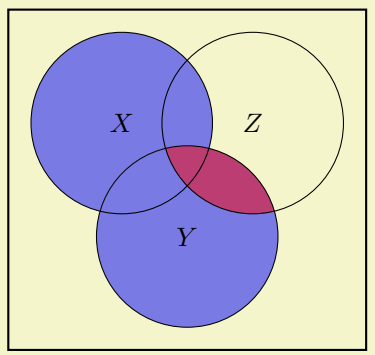
Number of sets. Only 2 or 3 are allowed.




```
\begin{tikzpicture}[Venn diagram={
 number of sets=2,
 style={fill=orange}}]
 \Venn{AnB}
\end{tikzpicture}
```

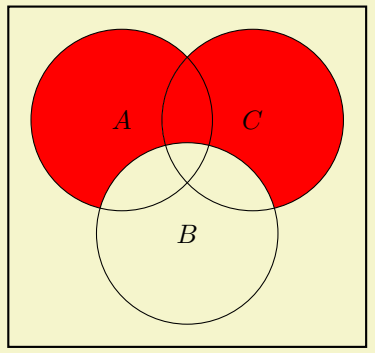
`/tikz/venn/labels` (initially {"A","B","C"})

Changes the labels (or names) of the sets. The names of the sets are to be used in the operations of the sets. Note that the number of entries in this list needs to be at least as large as the number of sets.




```
\begin{tikzpicture}[Venn diagram=
{labels={"X","Y","Z"}}]
 \Venn{XuY={fill=blue,opacity=0.5},
   YnZ={fill=red,opacity=0.5}}
\end{tikzpicture}
```

The `-` character indicates an exclusion. That is, `-B,AuC` means "exclude B and highlight the intersection of A and C, $A \cap C$".

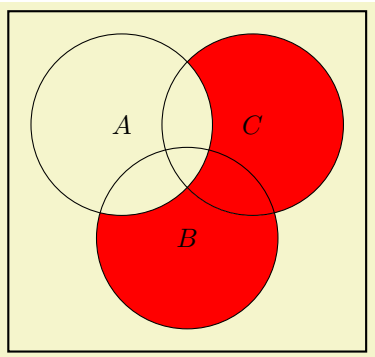



```
\begin{tikzpicture}[Venn diagram]
 \Venn{-B,AuC}
\end{tikzpicture}
```

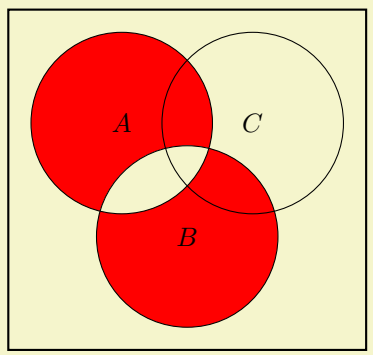
Many users may find it inconvenient to adopt to this way of thinking. That's why there is the `op` key.

`/tikz/venn/op` (initially `empty`)

Supports the syntax some set \ some other set. It is to be entered in the form `(valid set)/(another valid set)` with the valid sets being the ones discussed above (without any minus).




```
\begin{tikzpicture}[Venn diagram]
 \Venn{op={(BuC)/(A)}}
\end{tikzpicture}
```



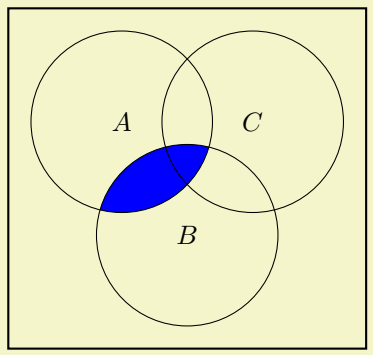

```
\begin{tikzpicture}[Venn diagram]
 \Venn{op={(AuB)/(AnB)}}
\end{tikzpicture}
```

1.2 Advanced options

The options discussed in section 1.1 will allow one to draw most of the standard sets, but not all. Sometimes one may want to access the building blocks to highlight more complicated sets.

`/tikz/venn/and` (no value)

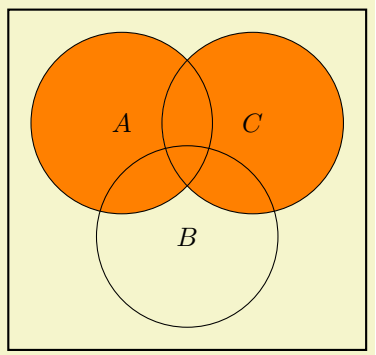
Intersection of two sets.




```
\begin{tikzpicture}[Venn diagram]
 \path[fill=blue,venn/and={A and B}];
\end{tikzpicture}
```

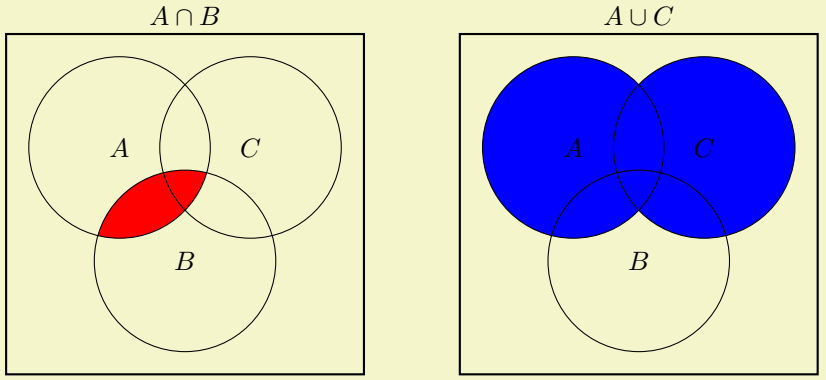
`/tikz/venn/union` (no value)

Union of two sets.




```
\begin{tikzpicture}[Venn diagram]
 \path[fill=orange,venn/union={A and C}];
\end{tikzpicture}
```

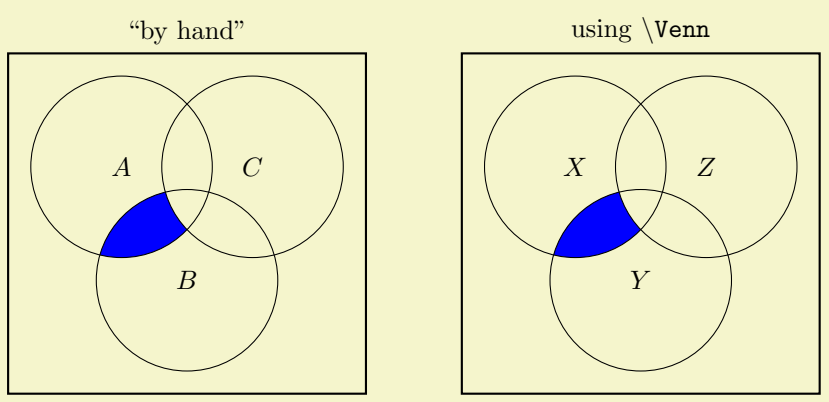
It may be important to know that one can use `Venn diagram` in scopes.




```
\begin{tikzpicture}
 \begin{scope}[Venn diagram,local bounding box=AnB]
  \Venn{AnB}
 \end{scope}
 \path (AnB.north) node[above] {$A\cap B$};
 \begin{scope}[Venn diagram={style={fill=blue}},xshift=6cm,local bounding box=AuC]
  \Venn{AuC}
 \end{scope}
 \path (AuC.north) node[above] {$A\cup C$};
\end{tikzpicture}
```

`/tikz/reverse clip` (no value)

This style has been adapted from https://tex.stackexchange.com/a/127045. It allows one to invert a clip selection. Notice that the orientation of the clip paths matters. Therefore there is `/tikz/reverse clip'` available which reverts the direction of the bounding box path.

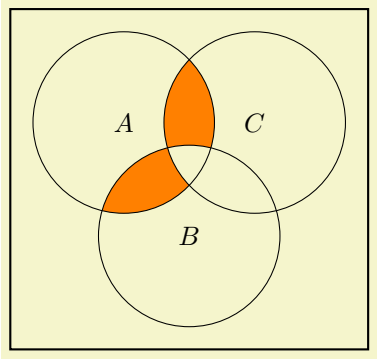



```
\begin{tikzpicture}
 \begin{scope}[Venn diagram={style={fill=blue},
  labels={"X","Y","Z"}},xshift=6cm,local bounding box=auto]
  \Venn{op={(XnY)/(Z)}}
 \end{scope}
 \path (AuC.north) node[above] {using \texttt{\textbackslash Venn}};
 \begin{scope}[Venn diagram,local bounding box=by hand]
   \clip (cC) circle[radius=\pgfkeysvalueof{/tikz/venn/radius}] [reverse clip];
   \path[fill=blue,venn/and={A and B}];
 \end{scope}
 \path (AnB.north) node[above] {``by hand''};
\end{tikzpicture}
```

/tikz/even odd clip (no value)

This style has been adapted from https://tex.stackexchange.com/a/76216. It allows one to apply the `even odd rule` to clips.

This key allows us to shade more complicated sets such as $A\cup\big((B\cup C)\setminus(B\cap C)\big)$.




```
\begin{tikzpicture}[Venn diagram,
 declare function={
 R=\pgfkeysvalueof{/tikz/venn/radius};}]
 \clip[even odd clip]
  (cB) circle[radius=R]
  (cC) circle[radius=R];
 \fill[orange] (cA) circle[radius=R];
\end{tikzpicture}
```