

TikZ: 한 걸음 더

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2020/5/30

공주대학교 문서작성워크숍 2020 Spring

한국텍학회 · 한국텍사용자그룹 (<http://ktug.org>)

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1 Introduction

What's "more"?

intersections

tangent line

filling

filling rules

data plot

from csv file

Graphic basics:

imaginary pen

current point

lift pen

move-to, line-to, curve-to

path

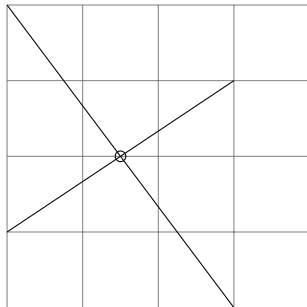
stroke (or draw)

fill

2 Intersections

2.1 intersection of two lines

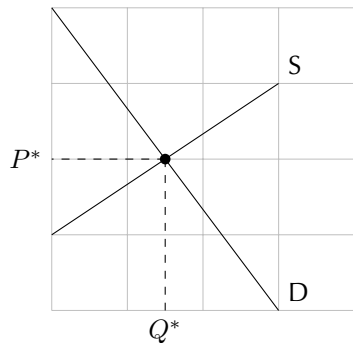
```
%% intersection: default
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\coordinate (A) at (0,4);
\coordinate (B) at (3,0);
\coordinate (C) at (0,1);
\coordinate (D) at (3,3);
\draw (A) -- (B);
\draw (C) -- (D);
\coordinate (X)
    at (intersection of A--B and C--D);
\draw (X) circle (2pt);
\end{tikzpicture}
```




```

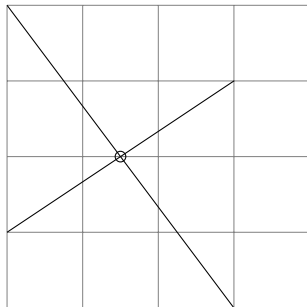
%% intersection: default
\begin{tikzpicture}
\draw [help lines,lightgray] (0,0) grid (4,4);
\draw (0,4) coordinate (D1)
      -- (3,0) coordinate (D2);
\draw (0,1) coordinate (S1)
      -- (3,3) coordinate (S2);
\coordinate (X)
      at (intersection of D1--D2 and S1--S2);
\fill (X) circle (2pt);
\draw [dashed] (X) -- (X |- 0,0) node [below] {$Q^*$};
\draw [dashed] (X) -- (X -| 0,0) node [left] {$P^*$};
\node at (D2) [above right] {D};
\node at (S2) [above right] {S};
\end{tikzpicture}

```



2.2 intersections of paths

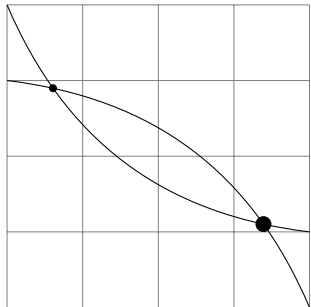
```
%% \usetikzlibrary{intersections}
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\coordinate (A) at (0,4);
\coordinate (B) at (3,0);
\coordinate (C) at (0,1);
\coordinate (D) at (3,3);
\draw [name path=AB] (A) -- (B);
\draw [name path=CD] (C) -- (D);
\path [name intersections = {of=AB and CD}];
\coordinate (X) at (intersection-1);
\draw (X) circle (2pt);
\end{tikzpicture}
```



```

\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\path (0,4) coordinate (U1) (4,1) coordinate (U2)
(0,3) coordinate (V1) (4,0) coordinate (V2);
\draw [name path=UU] (U1) to [bend right] (U2);
\draw [name path=VV] (V1) to [bend left] (V2);
\path [name intersections={of=UU and VV}];
\path (intersection-1) coordinate (X1)
(intersection-2) coordinate (X2);
\fill (X1) circle (1.5pt) (X2) circle (3pt);
\end{tikzpicture}

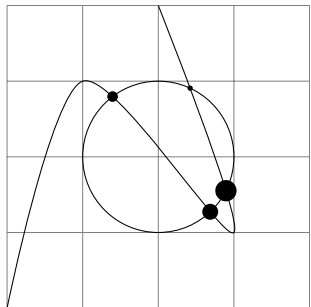
```



```

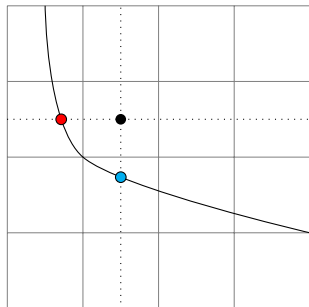
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\path (2,2) coordinate (A1) (4,1) coordinate (A2);
\draw [name path=circ] (A1) circle (1cm);
\draw [name path=plot] plot [smooth] coordinates
{(0,0) (1,3) (3,1) (2,4)};
\path [name intersections={of=circ and plot}];
\path (intersection-1) coordinate (X1)
(intersection-2) coordinate (X2);
\fill (X1) circle (1pt) (X2) circle (2pt)
(intersection-3) circle (3pt)
(intersection-4) circle (4pt);
\end{tikzpicture}

```



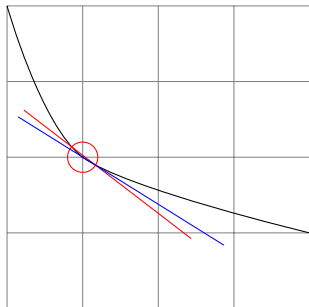
2.3 vertical and horizontal intersection points

```
%% tangent: circle
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\path (.5,4) coordinate (U1) (4,1) coordinate (U2);
\draw [name path=UU] plot [smooth] coordinates
  {(U1)(1,2)(U2)};
\path [fill] (1.5,2.5) coordinate (K) circle (2pt);
\coordinate (SW) at (current bounding box.south west);
\coordinate (NE) at (current bounding box.north east);
%% vertical intersection point
\draw [dotted,name path=vvvert] (K|-SW) -- (K|-NE);
\path [name intersections={of=UU and vvvert}];
\coordinate (A) at (intersection-1);
\draw [fill=cyan] (A) circle (2pt);
%% horizontal intersection point
\draw [dotted,name path=hhhoriz] (K-|SW) -- (K-|NE);
\path [name intersections={of=UU and hhhoriz}];
\coordinate (B) at (intersection-1);
\draw [fill=red] (B) circle (2pt);
\end{tikzpicture}
```



2.4 tangent lines: circle approach

```
%% \usetikzlibrary{intersections,calc}
%% tangent: circle
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\path (0,4) coordinate (U1) (4,1) coordinate (U2);
\draw [name path=UU] plot [smooth] coordinates
{(U1)(1,2)(U2)};
%% red (big circle)
\draw [name path=circ1,red] (1,2) circle (2mm);
\path [name intersections={of=UU and circ1}];
\path (intersection-1) coordinate (X1)
(intersection-2) coordinate (X2);
\draw [red] ($(X1)!-2!(X2)$) -- ($(X1)!5!(X2)$);
%% blue (very small circle)
\draw [name path=circ2,blue] (1,2) circle (.2pt);
\path [name intersections={of=UU and circ2}];
\path (intersection-1) coordinate (X1)
(intersection-2) coordinate (X2);
\draw [blue,shorten <=-1cm,shorten >=-2cm] (X1)--(X2);
\end{tikzpicture}
```

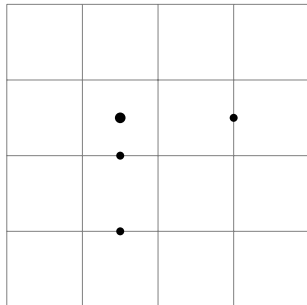


2.5 tangent lines: another approach

2.5.1 get x-coor and y-coor

```
%% in preamble
\makeatletter
\NewDocumentCommand\wkgetxyval{r()}mm
{
  \tikz@scan@one@point\pgfutil@firstofone(#1)\relax
  \pgfmathparse{\the\pgf@x/28.45274}% convert pt to cm
  \edef#2{\pgfmathresult}
  \pgfmathparse{\the\pgf@y/28.45274}% convert pt to cm
  \edef#3{\pgfmathresult}
}
\makeatother
```

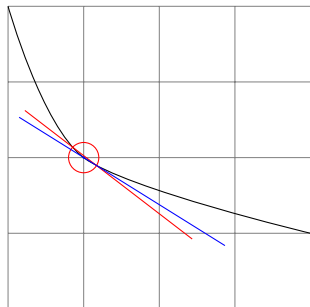
```
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\coordinate (A) at (1.5,2.5);
\mywkgetxyval(A){\xval}{\yval}
\fill (\xval,\yval) circle (2pt);
\fill (\xval,1) circle (1.5pt);
\fill (\xval,2) circle (1.5pt);
\fill (3,\yval) circle (1.5pt);
\end{tikzpicture}
```

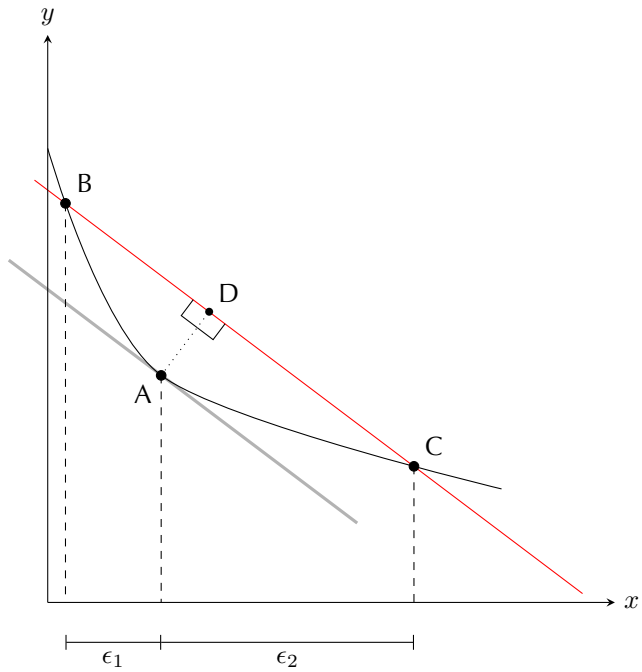


```

%% \usetikzlibrary{intersections,calc}
%% tangent: circle
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\path (0,4) coordinate (U1) (4,1) coordinate (U2);
\path (1,2) coordinate (A);
\draw [name path=UU] plot [smooth] coordinates
{(U1)(A)(U2)};
%% red (big circle)
\draw [name path=circ1,red] (A) circle (2mm);
\path [name intersections={of=UU and circ1}];
\path (intersection-1) coordinate (X1)
(intersection-2) coordinate (X2);
\draw [red] ($(X1)!-2!(X2)$) -- ($(X1)!5!(X2)$);
%% blue (very small circle)
\draw [name path=circ2,blue] (A) circle (.2pt);
\path [name intersections={of=UU and circ2}];
\path (intersection-1) coordinate (X1)
(intersection-2) coordinate (X2);
\draw [blue,shorten <=-1cm,shorten >=-2cm] (X1)--(X2);
\end{tikzpicture}

```





3 Filling Areas

```
fill  
pattern %% \usetikzlibrary{patterns}  
shade %% defaults or \usepackage{shadings}  
clip  
path picture
```

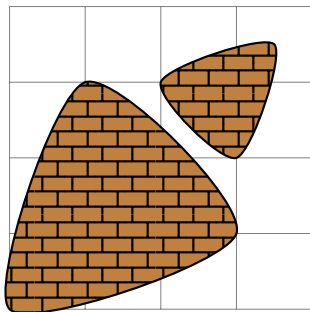
`white` 포함하여 다음과 같은 기본색을 쓸 수 있다.

 pink	 yellow	 lime
 green	 cyan	 teal
 blue	 violet	 magenta
 purple	 red	 orange
 brown	 olive	 black
 darkgray	 gray	 lightgray

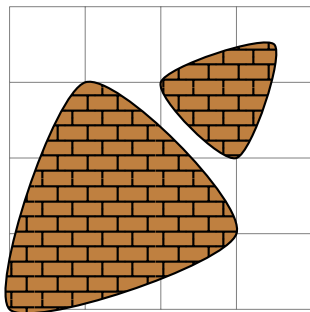
3.1 filling rules

3.1.1 nonzero rule (default)

```
%% \usetikzlibrary{patterns}
%% opposite direction
\begin{tikzpicture}[thick]
\draw [help lines] (0,0) grid (4,4);
\draw [preaction={fill=brown},pattern=bricks]
  plot [smooth cycle]
    coordinates {(0,0) (1,3) (3,1)} % lift pen
  plot [smooth cycle]
    coordinates {(2,3) (3,2) (3.5,3.5)};
\end{tikzpicture}
```



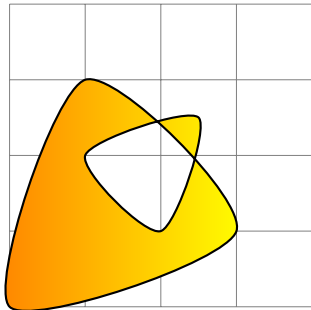
```
%% \usetikzlibrary{patterns}
%% same direction
\begin{tikzpicture}[thick]
\draw [help lines] (0,0) grid (4,4);
\draw [preaction={fill=brown},pattern=bricks]
  plot [smooth cycle]
    coordinates {(0,0) (1,3) (3,1)} % lift pen
  plot [smooth cycle]
    coordinates {(3,2) (2,3) (3.5,3.5)};
\end{tikzpicture}
```



```

%% opposite direction
\begin{tikzpicture}[thick]
\draw [help lines] (0,0) grid (4,4);
\draw [left color=orange,right color=yellow]
  plot [smooth cycle]
    coordinates {(0,0) (1,3) (3,1)} % lift pen
  plot [smooth cycle,shift={(-1,-1)}]
    coordinates {(2,3) (3,2) (3.5,3.5)};
\end{tikzpicture}

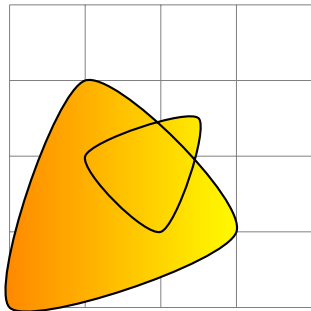
```



```

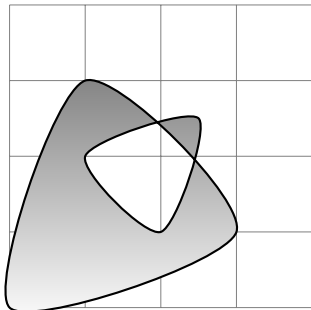
%% same direction
\begin{tikzpicture}[thick]
\draw [help lines] (0,0) grid (4,4);
\draw [left color=orange,right color=yellow]
  plot [smooth cycle]
    coordinates {(0,0) (1,3) (3,1)} % lift pen
  plot [smooth cycle,shift={(-1,-1)}]
    coordinates {(3,2) (2,3) (3.5,3.5)};
\end{tikzpicture}

```

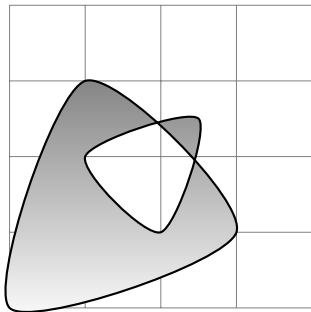


3.1.2 even odd rule

```
%% opposite direction
\begin{tikzpicture}[thick]
\draw [help lines] (0,0) grid (4,4);
\draw [shade]
  plot [smooth cycle]
    coordinates {(0,0) (1,3) (3,1)} % lift pen
  plot [smooth cycle,shift={(-1,-1)}]
    coordinates {(2,3) (3,2) (3.5,3.5)};
\end{tikzpicture}
```

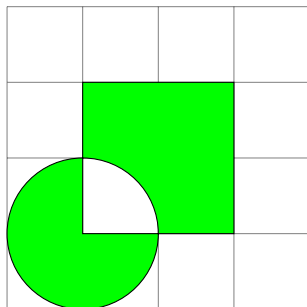


```
%% same direction
\begin{tikzpicture}[thick]
\draw [help lines] (0,0) grid (4,4);
\draw [shade,even odd rule]
  plot [smooth cycle]
    coordinates {(0,0) (1,3) (3,1)} % lift pen
  plot [smooth cycle,shift={(-1,-1)}]
    coordinates {(3,2) (2,3) (3.5,3.5)};
\end{tikzpicture}
```

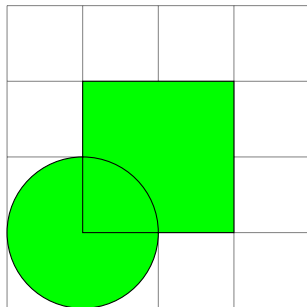


3.1.3 circles and rectangles: non zero rule

```
%% circle and rectangle (opposite direction)
%% nonzero rule (default)
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\draw [fill=green] (1,1) circle (1cm)
(1,1) rectangle (3,3);
\end{tikzpicture}
```

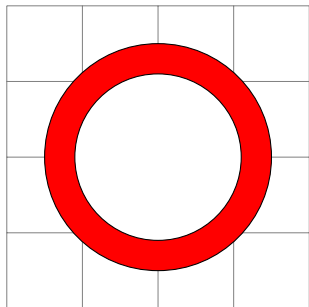


```
%% circle and rectangle (same direction)
%% nonzero rule (default)
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\draw [fill=green] (1,1) circle (1cm)
(1,3) rectangle (3,1);
\end{tikzpicture}
```

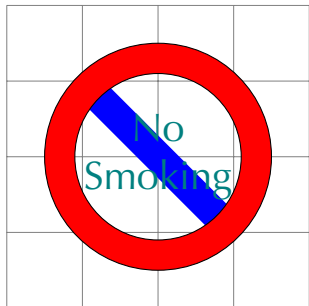


3.1.4 filling rules: circles

```
%% circle: counter clockwise
%% nonzero rule (default)
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\draw [line width=4mm,blue] (1,3) -- (3,1);
\node at (2,2)
    [teal,scale=1.5,align=center] {No\\ Smoking};
\draw [fill=red] (2,2) circle (1.5cm);
\draw [fill=white] (2,2) circle (1.1cm);
\end{tikzpicture}
```



```
%% circle: counter clockwise
%% even odd rule
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\draw [line width=4mm,blue] (1,3) -- (3,1);
\node at (2,2)
    [teal,scale=1.5,align=center] {No\\ Smoking};
\draw [fill=red,even odd rule]
    (2,2) circle (1.5cm)
    (2,2) circle (1.1cm);
\end{tikzpicture}
```



3.2 clipping

3.2.1 \clip

```
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\shade (.5,3.5) [ball color=orange] circle (.5cm);
\node at (2,2) [centered] % (default)
  { \includegraphics[width=4cm]{thankyou} };
\draw (3.5,.5) [shading=radial] circle (.5cm);
\end{tikzpicture}
```

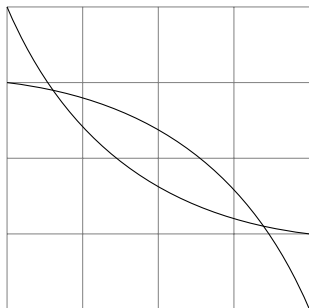


```
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\shade (.5,3.5) [ball color=orange] circle (.5cm);
%\begin{scope}
\clip [draw] (2,1) ellipse (2cm and .8cm);
\node at (2,2) [centered]
  { \includegraphics[width=4cm]{thankyou} };
%\end{scope}
\draw (3.5,.5) [shading=radial] circle (.5cm);
\end{tikzpicture}
```

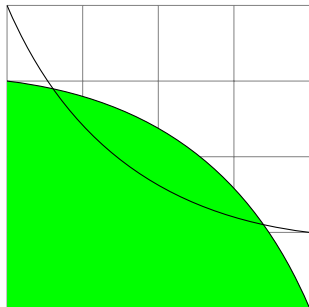


3.2.2 filling lens shapes: step by step

```
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\path (0,4) coordinate (A) (4,1) coordinate (B)
      (0,3) coordinate (C) (4,0) coordinate (D);
\draw (A) to [bend right] (B);
\draw (C) to [bend left] (D);
\end{tikzpicture}
```



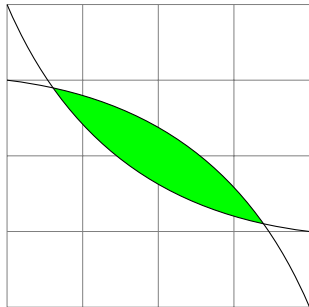
```
\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\path (0,4) coordinate (A) (4,1) coordinate (B)
      (0,3) coordinate (C) (4,0) coordinate (D);
%\begin{scope}
%\clip (A) to [bend right] (B) -- (4,4) -- cycle;
\path [fill=green]
      (C) to [bend left] (D) -- (0,0) -- cycle;
%\end{scope}
\draw (A) to [bend right] (B);
\draw (C) to [bend left] (D);
\end{tikzpicture}
```




```

\begin{tikzpicture}
\draw [help lines] (0,0) grid (4,4);
\path (0,4) coordinate (A) (4,1) coordinate (B)
      (0,3) coordinate (C) (4,0) coordinate (D);
\begin{scope}
\clip (A) to [bend right] (B) -- (4,4) -- cycle;
\path [fill=green]
      (C) to [bend left] (D) -- (0,0) -- cycle;
\end{scope}
\draw (A) to [bend right] (B);
\draw (C) to [bend left] (D);
\end{tikzpicture}

```



3.3 filling: path picture

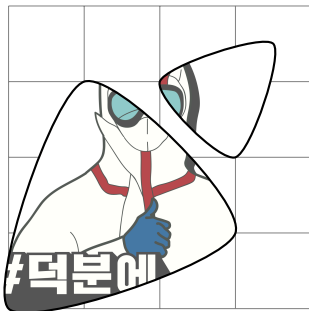
3.3.1 using path picture and \node

```
%% path picture
%% nonzero rule (default)
\begin{tikzpicture}[thick]
\draw [help lines] (0,0) grid (4,4);
\draw
  plot [smooth cycle]
    coordinates {(0,0) (1,3) (3,1)}
  plot [smooth cycle,shift={(-1,-.5)}]
    coordinates {(2,3)(3,2)(3.5,3.5)}
  [path picture=
    { \node at (1.5,1.7)
      {\includegraphics[width=3cm]{thankyou}} ;
    }
  ]
;
\end{tikzpicture}
```



3.3.2 path picture bounding box

```
%% path picture bounding box
\begin{tikzpicture}[thick]
\draw [help lines] (0,0) grid (4,4);
\draw [fill=yellow!50]
  plot [smooth cycle] coordinates {(0,0) (1,3) (3,1)}
  plot [smooth cycle] coordinates {(2,3) (3,2)
    (3.5,3.5)}
  [path picture=
    { \node at (path picture bounding box.center)
      {\includegraphics[width=4cm]{thankyou}} ; }
  ];
\end{tikzpicture}
```



4 Plotting Data

```
\usepackage{csvsimple} % for tables  
  %\usepackage{booktabs}  
  %\usepackage{longtable}
```

```
\usepackage{pgf-pie} % for pie charts  
  https://ctan.org/pkg/pgf-pie
```

4.1 tables

4.1.1 tabular environment

```
\begin{tabular}{|r|c|c|} \hline
  & C & D & \\ \hline
C & 2,2 & 0,3 & \\
D & 3,0 & 1,1 & \\ \hline
\end{tabular}
```

	C	D
C	2,2	0,3
D	3,0	1,1

```
\begin{tabular}{rcc} \toprule
  & C & D & \\ \midrule
C & 2,2 & 0,3 & \\
D & 3,0 & 1,1 & \\ \bottomrule
\end{tabular}
```

	C	D
C	2,2	0,3
D	3,0	1,1

4.1.2 이렇게 쉬울 수가: \usepackage{csvsimple}

```
\csvautotabular{PDcomma.csv}
```

	C	D
C	2,2	0,3
D	3,0	1,1

```
\csvautobooktabular{PDcomma.csv}
```

	C	D
C	2,2	0,3
D	3,0	1,1

4.2 csvsimple package

4.2.1 \csvautotabular and \csvautobooktabular

```
\csvautotabular{people.csv} % csv+auto+tabular
```

family	given	field	gender	Nobel
Smith	Adam	Economics	m	No
Curie	Marie	Physics	f	Yes
Nash	John	Mathematics	m	Yes
Messi	Lionel	Football	m	No
Teresa	Bojaxhiu	Religion	f	Yes

```
\csvautobooktabular{coronaK.csv} % csv+auto+book+tabular
```

성명	성별	체온	결과
가야지	m	36.5	N
나도가	f	37.9	N
다같이	f	37.6	P
라니까	m	38.0	P
마땅히	f	37.1	N

4.2.2 data format: \separator

- separator=comma (default)
※ data에 comma 또는 특수 문자가 있으면, { }로 감싼다.
- separator=semicolon

```
\csvautotabular[separator=semicolon]{PDsemicolon.csv}
```

	C	D
C	2,2	0,3
D	3,0	1,1

```
\csvautobooktabular[separator=semicolon]{PDsemicolon.csv}
```

	C	D
C	2,2	0,3
D	3,0	1,1

- separator=pipe

```
\csvautotabular[separator=pipe]{PDpipe.csv}
```

	C	D
C	2,2	0,3
D	3,0	1,1

```
\csvautobooktabular[separator=pipe]{PDpipe.csv}
```

	C	D
C	2,2	0,3
D	3,0	1,1

4.3 \csvreader (main topic)

```
\csvreader[<options>]{<myfile.csv>}{???}{<things to be repeated>} % more controls  
% 내부적으로 \csvloop 가 돈다.
```

```
\csvreader[autotabular]{coronaK.csv}{-}{\csvlinetotablerow} % option
```

성명	성별	체온	결과
가야지	m	36.5	N
나도가	f	37.9	N
다같이	f	37.6	P
라니까	m	38.0	P
마땅히	f	37.1	N

```
\csvreader[autobooktabular]{people.csv}{-}{\csvlinetotablerow} % option
```

family	given	field	gender	Nobel
Smith	Adam	Economics	m	No
Curie	Marie	Physics	f	Yes
Nash	John	Mathematics	m	Yes
Messi	Lionel	Football	m	No
Teresa	Bojaxhiu	Religion	f	Yes

4.3.1 \csvreader: within or without \tabular environment

data file 첫 줄은 header로 간주하고 처리하지 않으며,
둘째 줄부터 data value로 보고 자동 반복 처리한다.

tabular 환경 버전

```
%% \csvcoli,\csvcolii,\csvcoliii,...  
\begin{tabular}{ll}  
\csvreader  
  {people.csv}  
  {} % ???  
  {\csvcolii ~ \csvcoli & \textbf{\csvcoliii}} \\}  
\end{tabular}
```

Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

tabular 옵션 버전

```
%% 옵션: tabular  
%% (almost) same as above  
\csvreader  
  [tabular = 11] % table 형식으로 자동 반복 처리  
  {people.csv}  
  {} % ???  
  {\csvcolii ~ \csvcoli & \textbf{\csvcoliii}} %
```

Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

첫 줄이 필요하다면 직접 적어준다.
 데이터 값은 자동 반복 처리된다.
 줄도긋자. (옵션: [late after line=...])

```
%% tabular 환경 버전
\begin{tabular}{|l|c|} \hline
Who? & What? \\ \hline\hline
\csvreader
  [late after line = \\ \hline] %
  {people.csv}
  {}
  {\csvcolii~\csvcoli & \csvcoliii}
\end{tabular}
```

Who?	What?
Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

```
%% tabular 옵션 버전
%% same as above
\csvreader[
  tabular = |l|c| ,
  table head = \hline
  Who? & What? \\ \hline\hline ,
  late after line = \\ \hline
]
{people.csv}
{}
{\csvcolii~\csvcoli & \csvcoliii}
```

Who?	What?
Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

마지막 줄만 따로 처리하자. (옵션: [late after last line=...])

```
%% tabular 환경 버전
\begin{tabular}{lc}
    \toprule
    Person & Field \\
    \midrule
\csvreader[
    late after line      = \\ ,
    late after last line = \\ \bottomrule
]
{people.csv}
{}
{\csvcolii\ \csvcoli & \csvcoliii}
\end{tabular}
```

Person	Field
Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

```
%% tabular 옵션 버전
%% same as above
\csvreader[
    tabular = lc ,
    table head = \toprule
    Person & Field \\ \midrule ,
    late after line      = \\ ,
    late after last line = \\ \bottomrule
]
{people.csv}
{}
{\csvcolii\ \csvcoli & \csvcoliii}
```

Person	Field
Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

4.3.2 first line in a data file: [head] or [no head]

- csv file의 첫 줄도 data value인 경우, 첫 줄은 처리되지 않는다.
- 이 경우, 옵션 [no head]를 주면, 첫 줄을 제목으로 간주하지 않는다.

```
\begin{tabular}{|c|c|c|c|} \hline
\csvreader[
  late after line =    \\ \hline ,
]
{coronaKnoheader.csv}
{}
{\csvcoli & \csvcolii & \csvcoliii & \csvcoliv}
\end{tabular}
```

나도가	f	37.9	N
다같이	f	37.6	P
라니까	m	38.0	P
마땅히	f	37.1	N

```
%% 옵션: [no head]
\begin{tabular}{|c|c|c|c|} \hline
\csvreader[
  no head ,    % (default: head)
  late after line =    \\ \hline ,
]
{coronaKnoheader.csv}
{}
{\csvcoli & \csvcolii & \csvcoliii & \csvcoliv}
\end{tabular}
```

가야지	m	36.5	N
나도가	f	37.9	N
다같이	f	37.6	P
라니까	m	38.0	P
마땅히	f	37.1	N

- header를 직접 써 넣을 수 있다.

```

%% tabular 환경 버전
\begin{tabular}{|c|c|c|c|} \hline
I & II & III & IV \\ \hline
\csvreader[
  no head ,      % (default: head)
  late after line =  \\ \hline ,
]
{coronaKnoheader.csv}
{}
{\csvcoli & \csvcolii & \csvcoliii & \csvcoliv}
\end{tabular}

```

I	II	III	IV
가야지	m	36.5	N
나도가	f	37.9	N
다같이	f	37.6	P
라니까	m	38.0	P
마땅히	f	37.1	N

```

%% tabular 옵션 버전
\csvreader[
  tabular = |c|c|c|c| ,
  no head ,      % (default: head)
  table head =   \hline
  I & II & III & IV  \\ \hline ,
  late after line =  \\ \hline ,
]
{coronaKnoheader.csv}
{}
{\csvcoli & \csvcolii & \csvcoliii & \csvcoliv}

```

I	II	III	IV
가야지	m	36.5	N
나도가	f	37.9	N
다같이	f	37.6	P
라니까	m	38.0	P
마땅히	f	37.1	N

4.4 \csvreader: data header를 부르는 세 가지 방법

4.4.1 \csvcoli, \csvcolii, \csvcoliii, ...

```
\begin{tabular}{|l|c|} \hline
Who & What \\ \hline
\csvreader[
  late after line = \\ \hline ]
{people.csv}
{} % ???
{\csvcolii\ \csvcoli & \csvcoliii}
\end{tabular}
```

Who	What
Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

4.4.2 \csvreader[head to column names]

header를 그냥 매크로 형태로 가져다 쓸 수 있다.

```
%% 옵션: [head to column names]
\begin{tabular}{|l|c|} \hline
Who & What \\ \hline
\csvreader[ head to column names, %
  late after line = \\ \hline ]
{people.csv}
{} % ???
{\given\ \family & \field} %
\end{tabular}
```

Who	What
Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

4.4.3 두번째 필수 인자로 매크로 지정

```
%% 옵션: [head to column names]
\begin{tabular}{|l|c|} \hline
Who & What \\ \hline
\csvreader[ head to column names, %
  late after line = \\ \hline ]
{people.csv}
{\family=A, \given=B, \field=C} %
{\B\ A & \C} %
\end{tabular}
```

Who	What
Adam Smith	Economics
Marie Curie	Physics
John Nash	Mathematics
Lionel Messi	Football
Bojaxhiu Teresa	Religion

```
\begin{tabular}{|l|c|l|c|} \hline
Name & Sex & Temp. & Result \\ \hline
\csvreader[
  late after line = \\ ,
  late after last line = \\ \hline
]
{coronaK.csv}
{1=A, 2=B, 체온=C, \csvcoliv=D} %
{\A & \B & \C & \D}
\end{tabular}
```

Name	Sex	Temp.	Result
가야지	m	36.5	N
나도가	f	37.9	N
다같이	f	37.6	P
라니까	m	38.0	P
마땅히	f	37.1	N

4.4.4 example: color table

`white` 포함하여 다음과 같은 기본색을 쓸 수 있다.

	pink		yellow		lime
	green		cyan		teal
	blue		violet		magenta
	purple		red		orange
	brown		olive		black
	darkgray		gray		lightgray

```
\csvreader[ no head ,
  tabular = |l|l|l|l|l| ,
  late after line = \\ ,
  before reading = \tikzset{every picture/.style={line width=1em}} % global
]
{basecolor.csv}
{1=\A,2=\B,3=\C}
{%
  \tikz \draw [\A] (0,0) -- (1,0) node [right] {\A}; &
  \tikz \draw [\B] (0,0) -- (1,0) node [right] {\B}; &
  \tikz \draw [\C] (0,0) -- (1,0) node [right] {\C};
}
```


4.5 some more

4.5.1 \thecsvrow

번호를 붙여보자.

```
\begin{tabular}{|c|c|c|} \hline
  & Who? & Hot? \\ \hline
\csvreader[
  late after line = \\ \hline
]
{coronaK.csv}
{1=\AA, 3=\BB}
{\thecsvrow & \AA & \BB} %
\end{tabular}
```

	Who?	Hot?
1	가야지	36.5
2	나도가	37.9
3	다같이	37.6
4	라니까	38.0
5	마땅히	37.1

```
%% 옵션: [no head]
\begin{tabular}{|c|c|c|} \hline
  & Who? & Hot? \\ \hline
\csvreader[ no head, %
  late after line = \\ \hline
]
{coronaK.csv}
{1=\AA, 3=\BB}
{\thecsvrow & \AA & \BB} %
\end{tabular}
```

	Who?	Hot?
1	성명	체온
2	가야지	36.5
3	나도가	37.9
4	다같이	37.6
5	라니까	38.0
6	마땅히	37.1

4.5.2 filtering

음성인 사람만 골라 찍자.

```
%% filter equal
\csvautobooktabular
  [filter equal={\csvcoliv}{N}] %
  {coronaK.csv}
```

성명	성별	체온	결과
가야지	m	36.5	N
나도가	f	37.9	N
마땅히	f	37.1	N

행과 열을 골라 찍을 수 있다.

```
%% filter not equal
\csvreader[
  tabular = |c|c|,
  table head = \hline
  Who & Sex \\ \hline \hline,
  late after line = \\ \hline,
  filter not equal={\csvcolii}{m} %
]
{coronaK.csv}
{}
{\csvcoli & \csvcolii}
```

Who	Sex
나도가	f
다같이	f
마땅히	f

고열인 사람만 찍어보자.

```
%% filter ifthen
\csvautobooktabular
  [filter ifthen =
    \lengthtest{\csvcoliii pt>37.5pt}
  ]
{coronaK.csv}
```

성명	성별	체온	결과
나도가	f	37.9	N
다같이	f	37.6	P
라니까	m	38.0	P

내용도 바꿔보자.

```
%% \ifcsvstrcmp
\begin{tabular}{|c|c|c|} \hline
Name & 성별 & 체온 \\ \hline
\csvreader
  [late after line = \\ \hline]
  {coronaK.csv}
  {1=\A, 2=\B, 체온=\C}
  { \A
    & \ifcsvstrcmp{\B}{f}{ 여성 }{ 남성 }
    & \C
  }
\end{tabular}
```

Name	성별	체온
가야지	남성	36.5
나도가	여성	37.9
다같이	여성	37.6
라니까	남성	38.0
마땅히	여성	37.1

4.5.3 \csvstyle

옵션이 복잡해졌다.

```
%% \csvstyle
\csvstyle{optA}
{
  tabular = |r|c|c| ,
  table head = \hline
    & Name & Temperature \\\hline ,
  late after line = \\ ,
  late after last line = \\\hline
}

\csvreader
[optA]
{coronaK.csv}
{}
{\thecsvrow & \csvcoli & \csvcoliii}
```

	Name	Temperature
1	가야지	36.5
2	나도가	37.9
3	다같이	37.6
4	라니까	38.0
5	마땅히	37.1

4.5.4 \csvset

```
\csvset{opt1/.style={...},opt2/.style={...},opt3/.style=...}
```

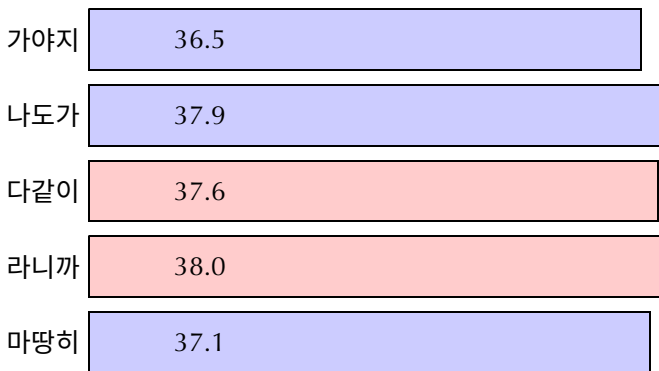
```
%% \csvset
\csvset{
  opt1/.style =
  {
    tabular = |c|c|c| ,
    table head = \hline
      A & B & C \\\hline ,
    table foot = \hline
  }
}

\csvreader
  [opt1]
  {coronaK.csv}
  {}
  {\csvcoli & \csvcolii & \csvcoliii}
```

A	B	C
가야지	m	36.5
나도가	f	37.9
다같이	f	37.6
라니까	m	38.0
마땅히	f	37.1

4.6 bar charts

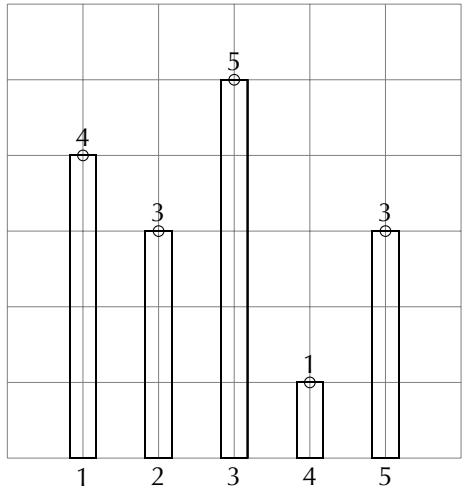
```
%% tikz: xbar
\tikzset{result/N/.style={fill=blue!20},
         result/P/.style={fill=red!20}}
\begin{tikzpicture}[xscale=.2]
\csvreader{coronaK.csv}{\%
  \path [draw,result/\csvcoliv]
    plot [xbar,bar width=8mm] (\csvcoliii,5-\thecsvrow)
      node at (0,5-\thecsvrow) [left] {\csvcoli}
      node at (5,5-\thecsvrow) [right] {\csvcoliii};
}
\end{tikzpicture}
```



```

%% ybar
\begin{tikzpicture}
\draw [help lines] (0,0) grid (6,6);
\csvreader{dataA.csv}{}
{ \draw plot [ybar]
  (\csvcoli,\csvcolii) circle
  (2pt)
  node [above] {\csvcolii}
  node at (\csvcoli,0) [below]
  {\csvcoli}; }
\end{tikzpicture}

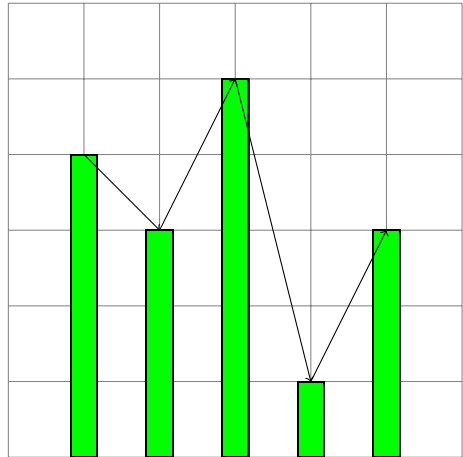
```



```

%% ybar
\begin{tikzpicture}
\draw [help lines] (0,0) grid (6,6);
\csvreader[after
  line=\edef\xx{\csvcoli}
  \edef\yy{\csvcolii} ]
{data.csv}{}
{ \draw [fill=green] plot [ybar]
  (\csvcoli,\csvcolii);
  \csviffirstrow
  {\xdef\xx{\csvcoli}
  \xdef\yy{\csvcolii}}
  {\draw [->] (\xx, \yy) --
  (\csvcoli,\csvcolii);}
}
\end{tikzpicture}

```



4.7 pie charts

```
\begin{tikzpicture}
%% \usepackage{pgf-pie}
\csvreader[no head]{dataB.csv}{}
{ \pie[pos={8,0},rotate=90,radius=3]{\csvcoli/A,\csvcolii/B,\csvcoliii/C} }
\end{tikzpicture}
```

