Tegnekurs i TikZ

Veronika Heimsbakk
veronahe@ulrik.uio.no

The Basics

Inkludere pakken:

```
\usepackage{tikz}
```

Opprette miljøet:

```
\begin{tikzpicture}
    <kode her>
\end{tikzpicture}
```

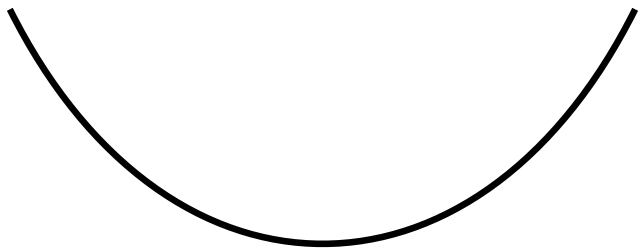
The Basics – tegne ei linje

- `\draw (0,0) -- (4,0);`

- `\draw (0em,0em) -- (4em,0em);`

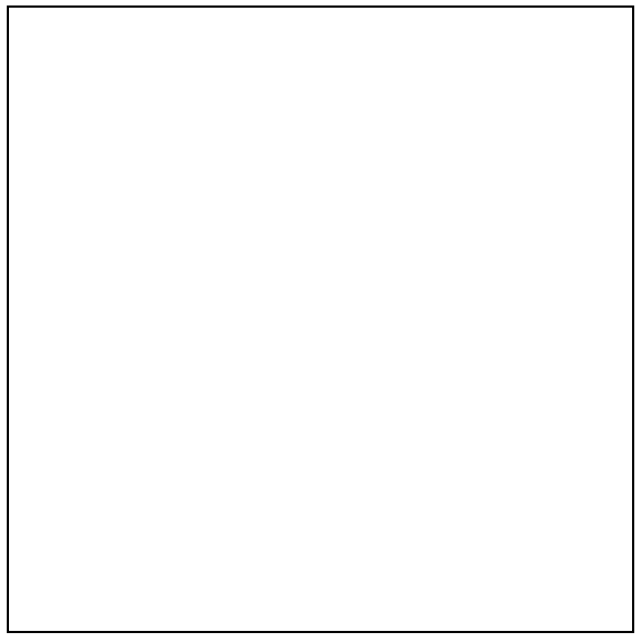
- `\draw (0pt,0pt) -- (4pt,0pt);`

The Basics – kvadrat



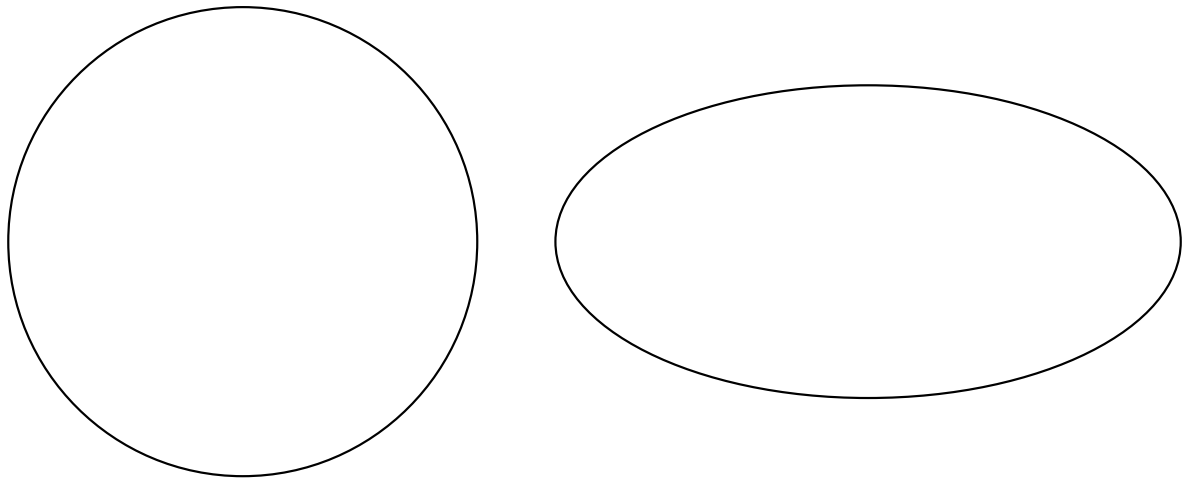
```
\draw (-2,2) .. controls (-1,0) and (1,0) .. (2,2);
```

The Basics – kvadrat



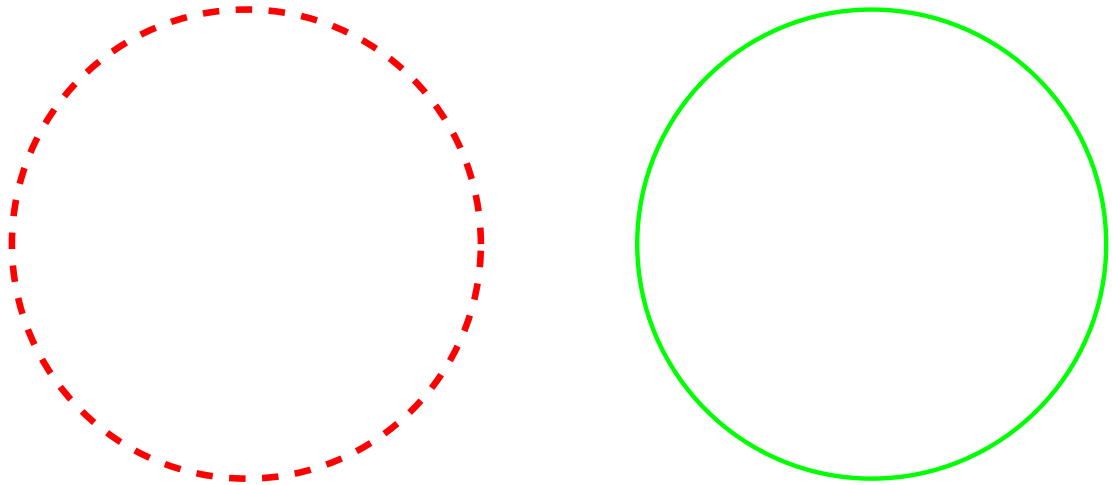
- `\draw (0,0) -- (4,0) -- (4,4) -- (0,4) -- (0,0);`
- `\draw (0,0) rectangle (4,4);`

The Basics – sirkel



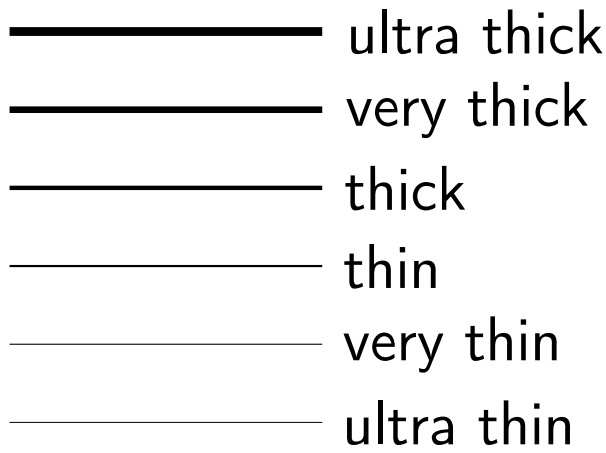
- `\draw (0,0) circle (1.5cm);`
- `\draw (0,0) ellipse (2cm and 1cm);`

The Basics – pynte litt



- `\draw[red, very thick, dashed] (0,0) circle (1.5cm);`
- `\draw[green, thick] (0,0) circle (1.5cm);`

The Basics – tykkelser

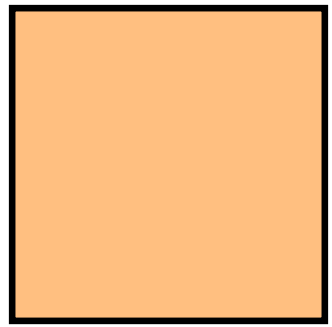


The Basics – farger

The Basics – fylle med farge

```
\fill[orange] (0,0) rectangle (2,2);
```

The Basics – fylle med farge og kant

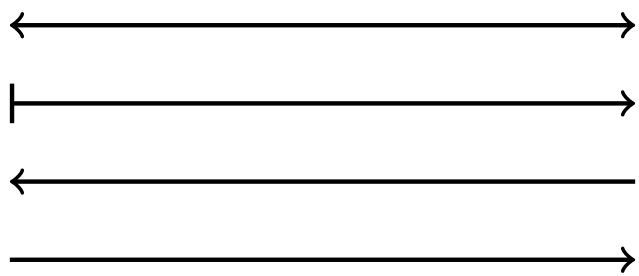


```
\filldraw[orange!50, draw=black, very thick] (0,0) rectangle (2,2);
```

The Basics – fylle med gradient

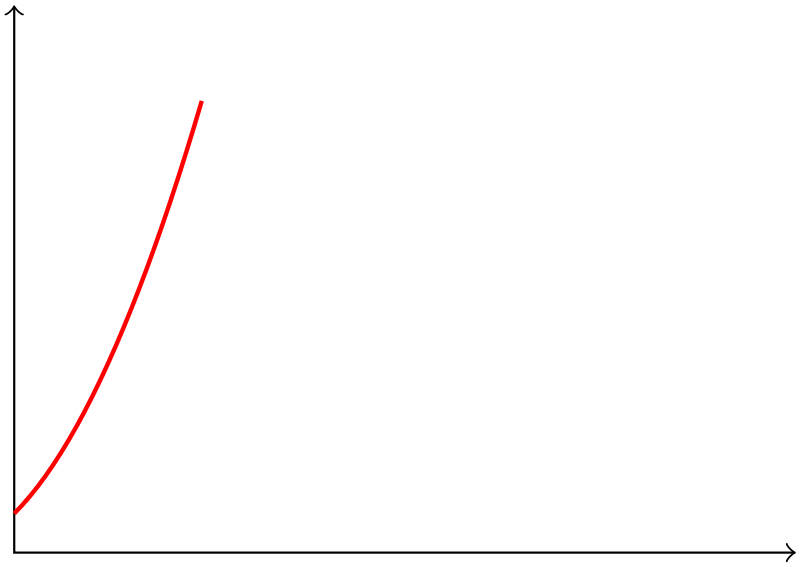
```
\shade[left color=orange, right color=yellow] (0,0) rectangle (2,2);
\shade[top color=orange, bottom color=yellow] (3,0) rectangle (5,2);
\shade[inner color=orange, outer color=yellow] (6,0) rectangle (8,2);
```

Piler i TikZ



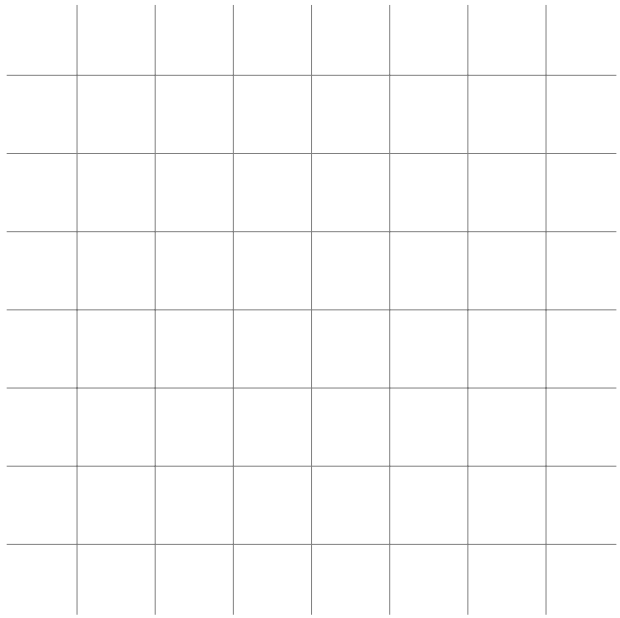
```
\draw[<->] (0,1.5) -- (4,1.5);
\draw[|->] (0,1) -- (4,1);
\draw[<-]  (0,0.5) -- (4,0.5);
\draw[->]  (0,0) -- (4,0);
```

Plotte funksjoner



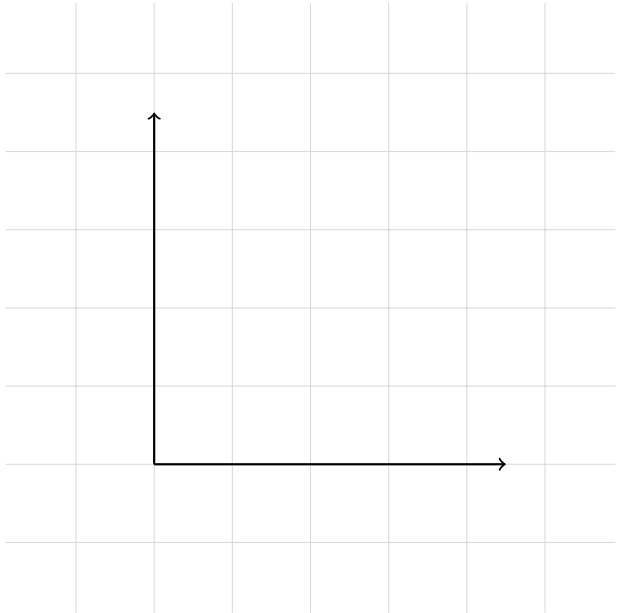
```
\begin{tikzpicture}
    \draw[<->] (0,3.5) -- (0,0) -- (5,0);
    \draw[red, thick, domain=0:1.2] plot (\x, {0.25+\x+\x*\x});
\end{tikzpicture}
```

Rutenett med akser



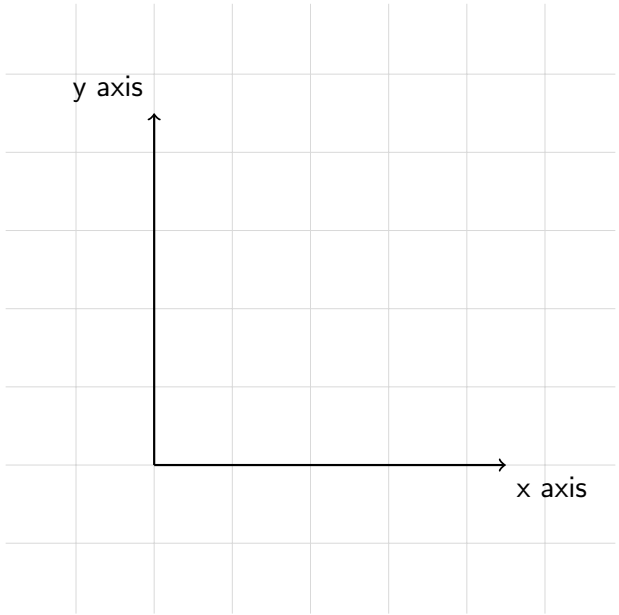
```
\draw[step=1cm,gray,very thin] (-1.9,-1.9) grid (5.9,5.9);
```

Rutenett med akser



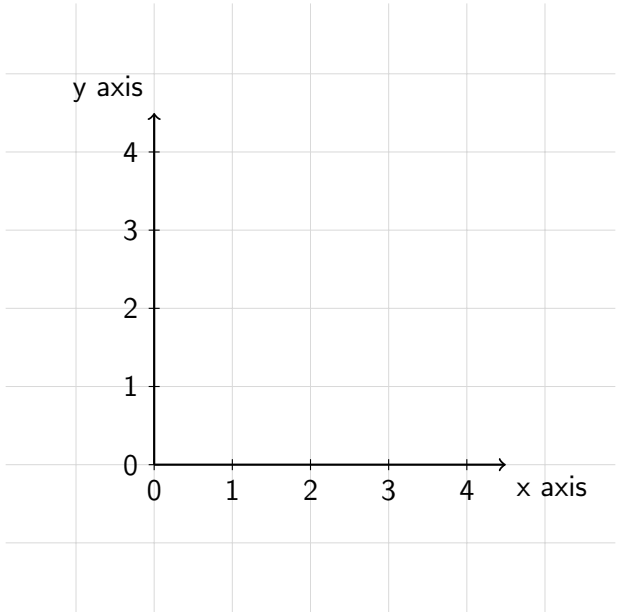
```
\draw[step=1cm,gray!30,very thin] (-1.9,-1.9) grid (5.9,5.9);
\draw[thick, ->] (0,0) -- (4.5,0);
\draw[thick, ->] (0,0) -- (0,4.5);
```

Rutenett med akser



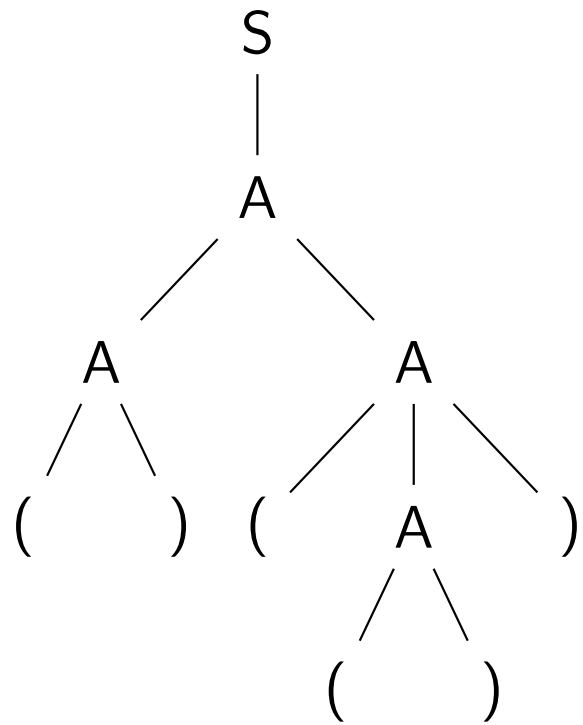

```
\draw[thick, ->] (0,0) -- (4.5,0) node[below right] {x axis};
\draw[thick, ->] (0,0) -- (0,4.5) node[above left]  {y axis};
```

Rutenett med akser



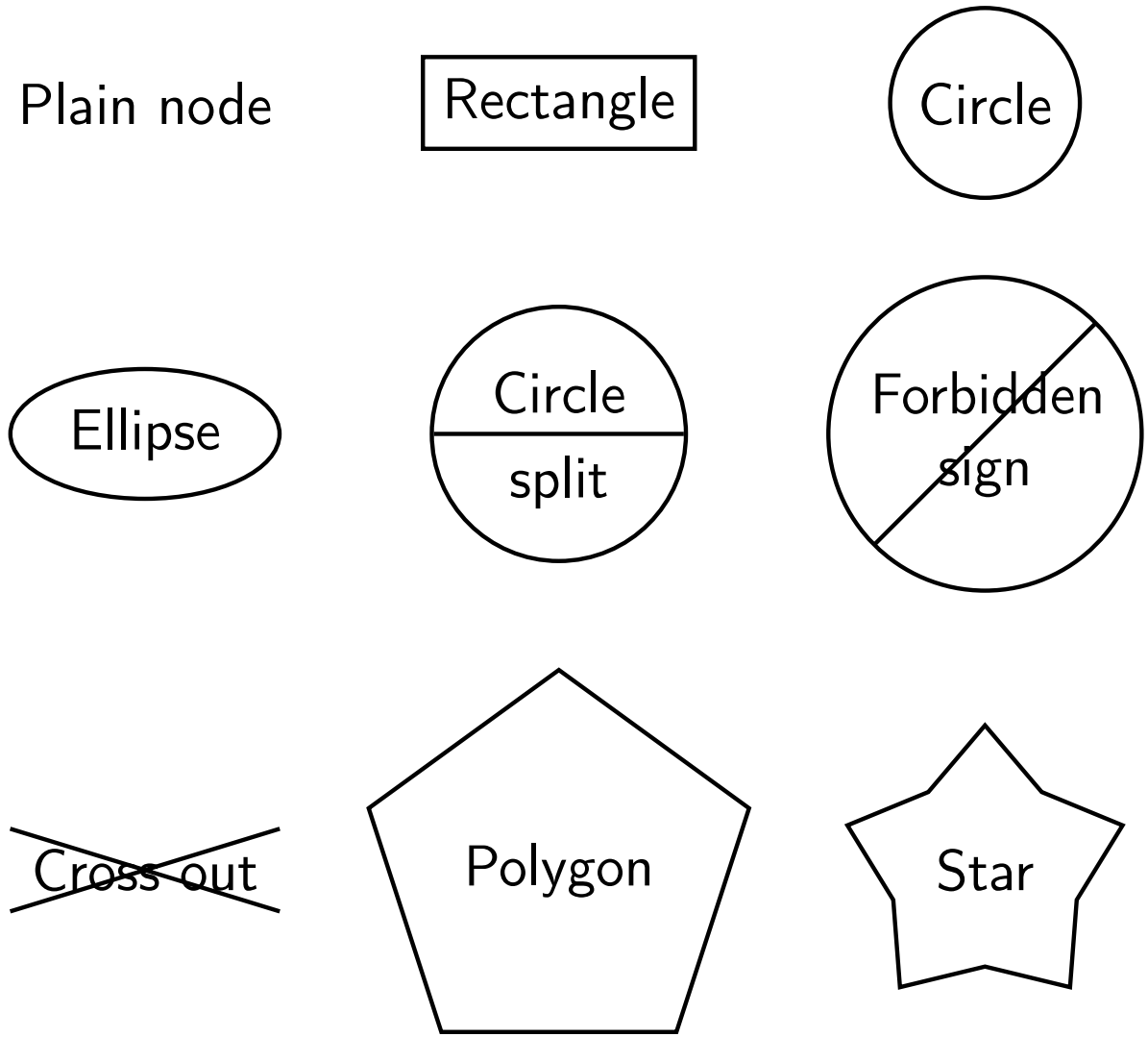

```
\foreach \x in {0,1,2,3,4}
  \draw (\x cm, 2pt) -- (\x cm, -2pt) node[below] {$\x$};
\foreach \y in {0,1,2,3,4}
  \draw (2pt, \y cm) -- (-2pt, \y cm) node[left]  {$\y$};
```

Trær



Noder – fasonger

\usetikzpackage{shapes}

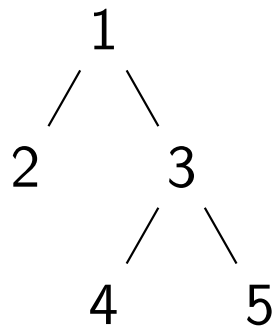


Trær – bygge et tre

Rot-noden:


```
\node {1};
```

Bygger videre:

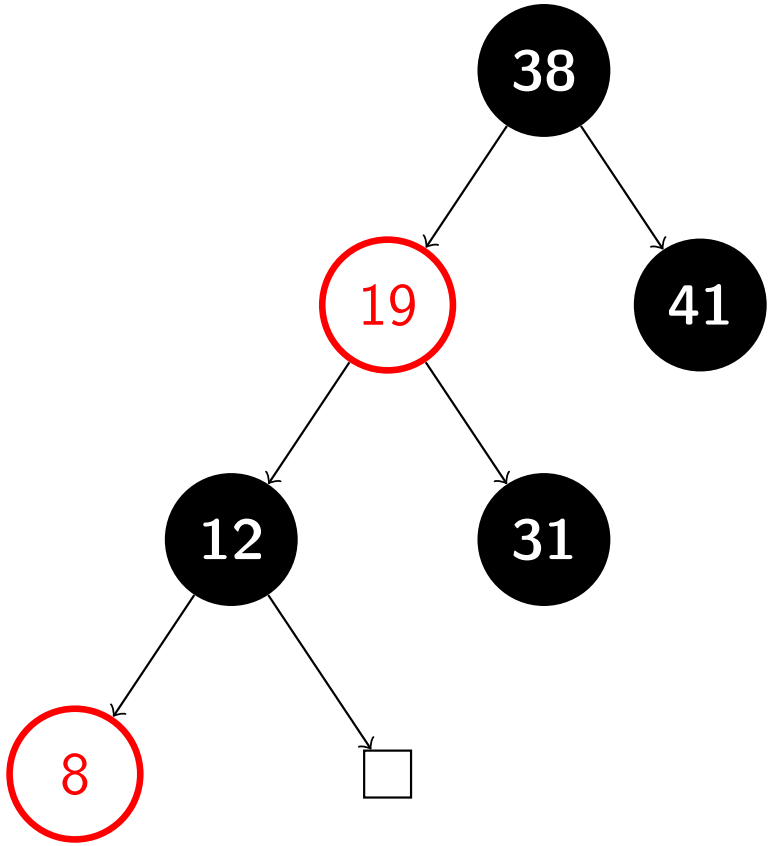



```
\node {1}
    child { node {2} }
    child { node {3}
        child { node {4} }
        child { node {5} }
    }
;
```

Trær

```
\begin{tikzpicture}[every node/.style={},
                    level 2/.style={sibling distance=20mm},
                    level 3/.style={sibling distance=10mm},
                    level distance=30pt]
\node {S}
    child { node{A}
        child { node {A}
            child { node {(} }
            child { node {)} }
        }
        child { node {A}
            child { node {(} }
            child { node {A}
                child { node {(} }
                child { node {)} }
            }
            child { node {)} }
        }
    }
;
\end{tikzpicture}
```

Rød-svarte trær



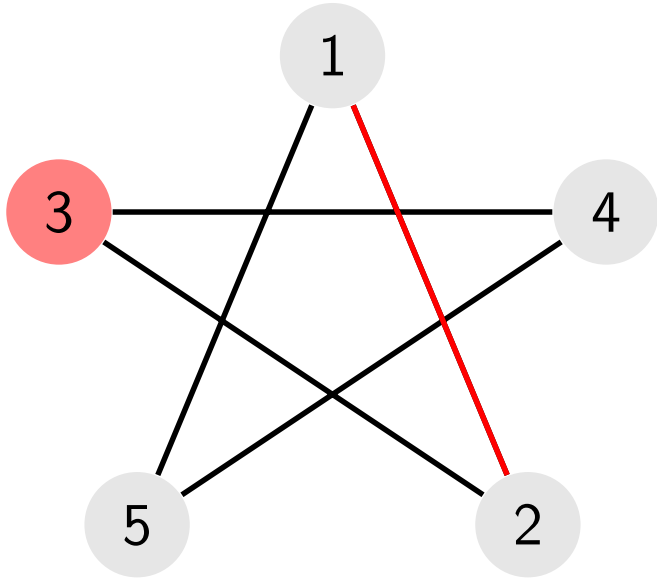
Trær

```
\tikzset{
   treenode/.style = {align=center, inner sep=0pt},

   % Sorte noder
   node_black/.style = {treenode, circle, white,
                        font=\bfseries, draw=black,
                        fill=black, text width=0.8cm},
   % Røde noder
   node_red/.style = {treenode, circle, red, draw=red,
                       text width=0.8cm, very thick},
   % Null-pekere
   node_null/.style = {treenode, rectangle, draw=black,
                        minimum width=0.3cm,
                        minimum height=0.3cm}
}
```

Trær

```
\begin{tikzpicture}[->,level/.style={ sibling distance = 2cm,
                    level distance = 1.5cm }]

\node [node_black] {38}
    child {node [node_red] {19}
        child {node [node_black] {12}
            child {node [node_red] {8} }
            child {node [node_null] {} }
        }
        child {node [node_black] {31} }
    }
    child { node [node_black] {41} }
;
\end{tikzpicture}
```

Grafer



- Noder (`vertex`)
- Markerte noder (`selected vertex`)
- Kanter (`edge`)
- Markerte kanter (`selected edge`)

Grafer – noder


```
\tikzstyle{vertex} = [circle,fill=black!10]
\tikzstyle{selected vertex} = [vertex, fill=red!50]

% Tegne nodene
\node[vertex]          (v1) at (0,0)   {1};
\node[selected vertex] (v2) at (0.5,0) {2};
```

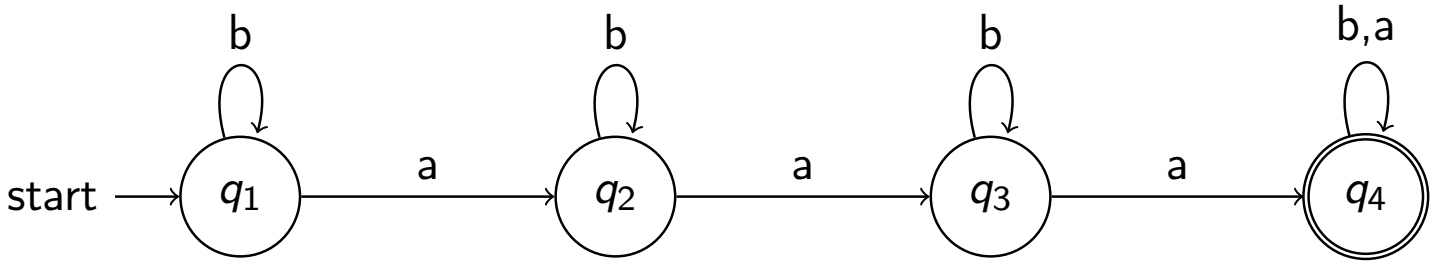
Grafer – kanter


```
\tikzstyle{selected edge} = [draw,line width=1pt,-,red!100]
\tikzstyle{edge} = [-,black,line width=1pt]

% Tegne nodene
\node[vertex] (v1) at (0,0)   {1};
\node[vertex] (v2) at (0.5,0) {2};
\node[vertex] (v3) at (1,0)   {3};

% Tegne kantene
\draw[edge]          (v1) -- (v2);
\draw[selected edge] (v2) -- (v3);
```

Grafer – kanter

```
\begin{tikzpicture}
    \tikzstyle{vertex}          = [circle,fill=black!10]
    \tikzstyle{selected vertex}= [vertex, fill=red!50]

    \tikzstyle{selected edge}  = [draw,line width=1pt,-,red!100]
    \tikzstyle{edge}            = [-,black,line width=1pt]

    \node[vertex]          (v1) at (1.25,1.7) {1};
    \node[vertex]          (v2) at (1.5,1.1)  {2};
    \node[selected vertex] (v3) at (0.9,1.5)  {3};
    \node[vertex]          (v4) at (1.6,1.5)  {4};
    \node[vertex]          (v5) at (1,1.1)    {5};

    \draw[edge]          (v1)--(v2)--(v3)--(v4)--(v5)--(v1);
    \draw[selected edge] (v1)--(v2);
\end{tikzpicture}
```

Automater



Må inkludere `\usetikzlibrary{automata}`.

Automater

```
\begin{tikzpicture}[->,auto,node distance=3cm,line width=0.2mm]
  \node[initial,state   (A)                    {$q_1$};
  \node[state]          (B) [right of=A]       {$q_2$};
  \node[state]          (C) [right of=B]       {$q_3$};
  \node[state,accepting](D) [right of=C]       {$q_4$};

  \path (A) edge [loop above] node   {b}   (A)
    edge node                        {a}   (B)
        (B) edge [loop above] node   {b}   (B)
    edge node                        {a}   (C)
        (C) edge [loop above] node   {b}   (C)
    edge node                        {a}   (D)
        (D) edge [loop above] node   {b,a} (D);
\end{tikzpicture}
```