Graphs using LaTeX

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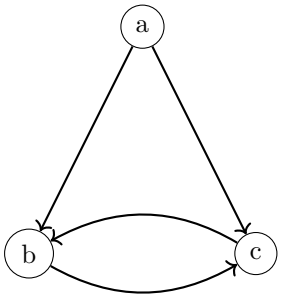
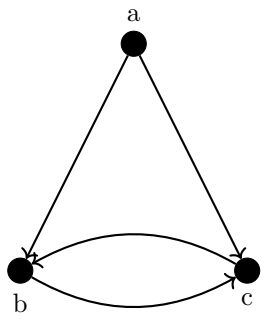
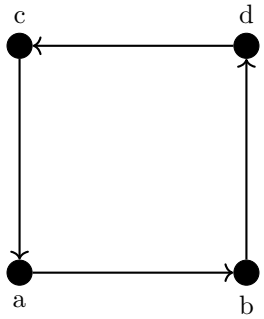


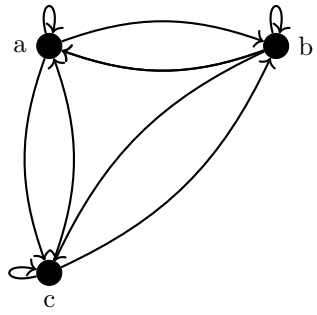

```
\begin{tikzpicture}[fill=white]
        \path (1.5,3) node(a)[circle, draw
        ↪  , fill]{a}
        (0,0) node(b)[circle, draw,
        ↪  fill]{b}
        (3,0) node(c)[circle, draw,
        ↪  fill]{c};
        \draw [thick, black,->] (a)--(b);
        \draw [thick, black,->] (a)--(c);
        \draw [thick, black,->, bend
        ↪  right=30] (b) to (c);
        \draw [thick, black,->, bend
        ↪  right=30] (c) to (b);
\end{tikzpicture}
```



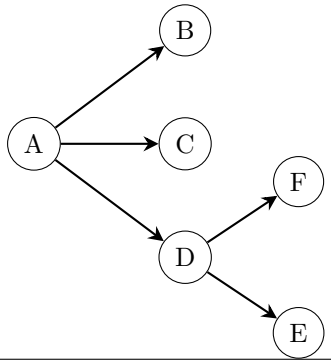

```
\begin{tikzpicture}[fill=black]
    \path
        (1.5,3) node(a)[circle, draw,
        ↪  fill, label=a]{}
        (0,0) node(b)[circle, draw, fill,
        ↪  label=below:b]{}
        (3,0) node(c)[circle, draw, fill,
        ↪  label=below:c]{};
    \draw [thick, black, ->] (a) -- (b);
    \draw [thick, black, ->] (a) -- (c);
    \draw [thick, black, ->, bend
    ↪  right=30] (b) --(c);
    \draw [thick, black, ->, bend
    ↪  right=30] (c) --(b);
\end{tikzpicture}
```



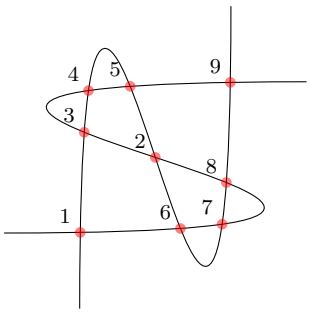

```
        \begin{tikzpicture}[fill=black]
                \path (0,0)
                ↪  node(a)[circle,draw,
                ↪  fill,label=below:a] {}
                (3,0) node(b)[circle,draw,
                ↪  fill,label=below:b] {}
                (0,3) node(c)[circle,draw,
                ↪  fill,label=above:c] {}
                (3,3) node(d)[circle,draw,
                ↪  fill,label=above:d]
                ↪  {};
                \draw[thick,black,->]
                ↪  (a)--(b);
                \draw[thick,black,->]
                ↪  (b)--(d);
                \draw[thick,black,->]
                ↪  (d)--(c);
                \draw[thick,black,->]
                ↪  (c)--(a);
        \end{tikzpicture}
```



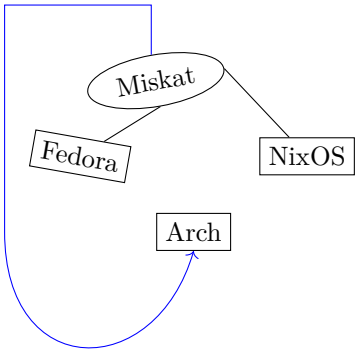

```
\begin{tikzpicture}[fill=black]
            \path (0,0) node(c)[circle, draw,fill,
            ↪  label=below:c]{}
            (0,3) node(a)[circle,draw,fill, label=left:a]{}
            (3,3) node(b)[circle,draw,fill, label=right:b]{};
            \draw[thick,black,->, bend left=20] (a) to (b);
            \draw[thick,black,->, bend left=20] (b) to (a);
            \draw[thick,black,->, bend left=20] (b) to (a);
            \draw[thick,black,->, bend right=20] (a) to (c);
            \draw[thick,black,->, bend right=20] (c) to (a);
            \draw[thick,black,->, bend right=20] (c) to (b);
            \draw[thick,black,->, bend right=20] (b) to (c);
            \draw[thick,black,->, loop above] (a) to (a);
            \draw[thick,black,->, loop above] (b) to (b);
            \draw[thick,black,->, loop left] (c) to (c);

\end{tikzpicture}
```



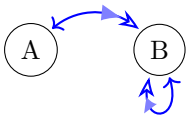

```
    \begin{tikzpicture}[fill=white]
            \path (0,1.5) node(a)[circle,draw,fill]{A}
            (2,3) node(b)[circle,draw,fill]{B}
            (2,1.5)node(c)[circle,draw,fill]{C}
            (2,0)node(d)[circle,draw,fill]{D}
            (3.5,-1) node(e)[circle,draw,fill]{E}
            (3.5,1) node(f)[circle,draw,fill]{F};
\draw [thick,black,->] (a) to (b);
            \draw [thick,black,->] (a) to (c);
            \draw [thick,black,->] (a) to (d);
            \draw [thick,black,->] (d) to (e) ;
            \draw [thick,black,->] (d) to (f);
    \end{tikzpicture}
```



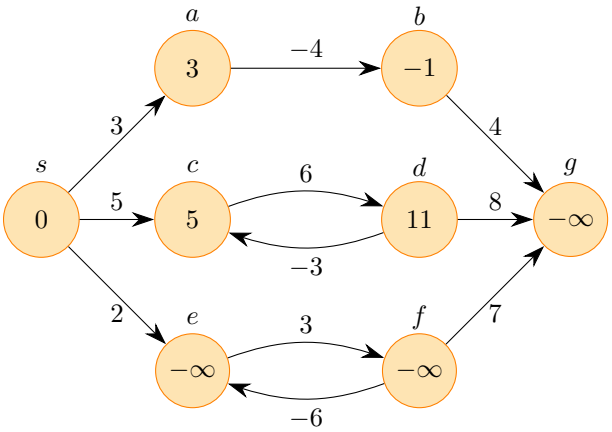

```
    \begin{tikzpicture}
            \clip (-2,-2) rectangle (2,2);
            \draw [name path=curve 1] (-2,-1) .. controls
            ↪  (8,-1) and (-8,1) .. (2,1);
            \draw [name path=curve 2] (-1,-2) .. controls
            ↪  (-1,8) and (1,-8) .. (1,2);
            \fill [name intersections={of=curve 1 and curve 2,
            ↪  name=i, total=\t}]
            [red, opacity=0.5, every node/.style={above left,
            ↪  black, opacity=1}]
            \foreach \s in {1,...,\t}{(i-\s) circle (2pt) node
            ↪  {\footnotesize\s}};
    \end{tikzpicture}
```




```
\begin{tikzpicture}[fill=white]
      \path (4,4)
      ↪  node(a)[ellipse,draw,fill,rotate=10]{Miskat}
      (3,3) node(b) [rectangle,
      ↪  draw,fill,rotate=-10]{Fedora}
      (6,3) node(c) [rectangle,draw,fill]{NixOS}
      (4.5,2) node(d) [rectangle,draw,fill]{Arch};
      \draw (a.south) -- (b);
      \draw (a.east) -- (c);
      \draw [blue,->](a.north) |-(2,5) -- (2,2) ..
      ↪  controls (2,0) and (4,0) .. (d.south);
\end{tikzpicture}
```

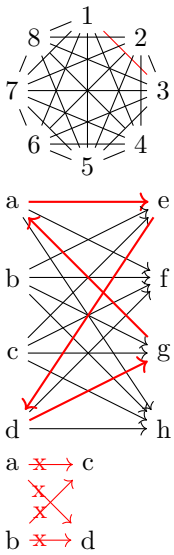



```
\begin{tikzpicture}
      \node [circle,draw] (A)
      {A};
      \node [circle,draw] (B) [right=of A] {B};
      \draw [draw = blue, thick,
            arrows={
            Computer Modern Rightarrow [sep]
      - Latex[blue!50,length=8pt,bend,line width=0pt]
      Stealth[length=8pt,open,bend,sep]}]
(A) edge [bend left=45] (B)
(B) edge [in=-110, out=-70,looseness=8] (B);
\end{tikzpicture}
```

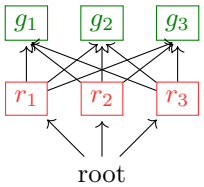



```
\usepackage[svgnames]{xcolor}
\definecolor{grapth}{HTML}{FEE4B3}
\begin{tikzpicture}[fill=grapth]
      \path (0,0) node(a) [circle,draw=orange,fill,minimum size=1cm]{0}
      (2,2)node(b)[circle, draw=orange, fill,minimum size=1cm]{3}
      (2,-2)node(c)[circle,draw=orange,fill]{$-\infty$}
      (2,0)node(d)[circle,draw=orange,fill,minimum size = 1cm]{$5$}
      (5,0)node(e)[circle,draw=orange,fill,minimum size=1cm]{$11$}
      (5,2)node(f)[circle,draw=orange,fill,minimum size = 1cm]{$-1$}
      (5,-2)node(g)[circle,draw=orange,fill]{$-\infty$}
      (7,0)node(h)[circle,draw=orange,fill]{$-\infty$};
      \draw[-{Stealth[length=0.3cm,width=0.2cm]},](a)to node[midway,above]{$3$}(b);
      \draw[-{Stealth[length=0.3cm,width=0.2cm]}](a)--node[midway, below]{$2$}(c);
      \draw[-{Stealth[length=0.3cm,width=0.2cm]}](a)--node[midway,above]{$5$}(d);
```

```
        \draw[-{Stealth[length=0.3cm,width=0.2cm]},bend left = 20](d)to
        ↪  node[midway,above]{$6$}(e);
        \draw[-{Stealth[length=0.3cm,width=0.2cm]},bend left = 20](e)to
        ↪  node[midway,below]{$-3$}(d);
        \draw[-{Stealth[length=0.3cm,width=0.2cm]},bend left = 20](c)to node[midway,
        ↪  above]{$3$}(g);
        \draw[-{Stealth[length=0.3cm,width=0.2cm]},bend left = 20](g)to
        ↪  node[midway,below]{$-6$}(c);
        \draw[-{Stealth[length=0.3cm,width=0.2cm]}](b) to node[midway,above]{$-4$}(f);
        \draw[-{Stealth[length=0.3cm,width=0.2cm]}](f)-- node[midway,above]{$4$}(h);
        \draw[-{Stealth[length=0.3cm,width=0.2cm]}](e)-- node[midway,above]{$8$}(h);
        \draw[-{Stealth[length=0.3cm,width=0.2cm]}](g)-- node[midway,below]{$7$}(h);
        \node at(0,0.7){$s$};
        \node at(2,0.7){$c$};
        \node at(5,0.7){$d$};
        \node at(7,0.7){$g$};
        \node at(2,-1.3){$e$};
        \node at(5,-1.3){$f$};
        \node at(2,2.7){$a$};
        \node at(5,2.7){$b$};
\end{tikzpicture}
```

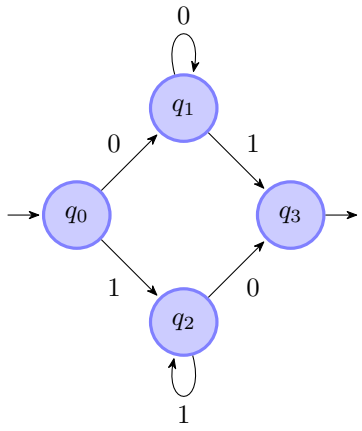



```
        \usetikzlibrary {graphs.standard}
        \tikz \graph [simple] {
        subgraph K_n [n=8, clockwise];
        % Get rid of the following edges:
        1 -!- 2;
        3 -!- 4;
        6 -!- 8;
        % And make one edge red:
        1 --[red] 3;
        };

        \usetikzlibrary {graphs}
        \tikz \graph [simple, grow right=2cm] {
        {a,b,c,d} ->[complete bipartite] {e,f,g,h};
        { [edges={red,thick}] a -> e -> d -> g -> a };
        };
        \usetikzlibrary {graphs,quotes}
        \tikz
        \graph [edge quotes=near start] {
        { a, b } -> [red, "x", complete bipartite] { c, d
        ↪  };
        };
```

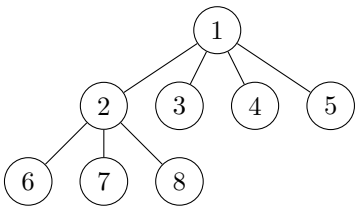



```
        \begin{tikzpicture}[new set=red, new set=green, shorten >=2pt]
                \foreach \i in {1,2,3} {
                        \node [draw, red!80,
```

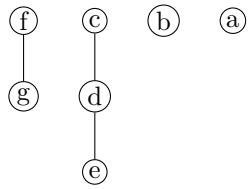
```
                                    set=red]
                            (r\i) at (\i,1) {$r_\i$};
                            \node [draw, green!50!black, set=green] (g\i) at (\i,2) {$g_\i$};
                    }
            \graph {
            root [xshift=2cm] ->
            (red)
            -> [complete bipartite, right anchor=south]
            (green)
            };
    \end{tikzpicture}
```



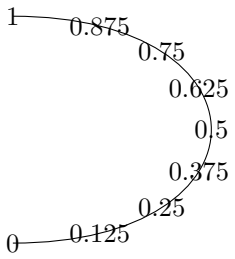

```
\usetikzlibrary
↪  {arrows.meta,automata,positioning}
\begin{tikzpicture}
        [shorten >=1pt,node distance=2cm,on
        ↪  grid,>={Stealth[round]},initial
        ↪  text=,
        every state/.style={draw=blue!50,very
        ↪  thick,fill=blue!20},
        accepting/.style=accepting by arrow]
        \node[state,initial] (q_0)
        {$q_0$};
        \node[state]
        (q_1) [above right=of q_0] {$q_1$};
        \node[state]
        (q_2) [below right=of q_0] {$q_2$};
        \node[state,accepting](q_3) [below
        ↪  right=of q_1] {$q_3$};
        \path[->] (q_0) edge
        node [above left] {0} (q_1)
        edge
        node [below left] {1} (q_2)
        (q_1) edge
        node [above right] {1} (q_3)
        edge [loop above] node
                {0} ()
        (q_2) edge
        node [below right] {0} (q_3)
        edge [loop below] node
                {1} ();
\end{tikzpicture}
```



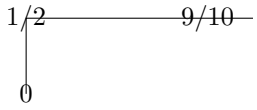

```
        \tikz \graph [tree layout, sibling
        ↪  distance=1cm, nodes={circle,draw}]
        { 1--{2--{6,7,8},3,4,5} };
```



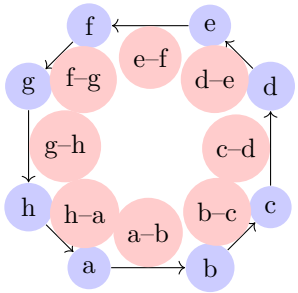

```
        \tikz \graph [tree layout, nodes={inner
        ↪  sep=1pt,draw,circle},
                component direction=left]
        { a, b, c -- d -- e, f -- g };
```




```
\tikz \draw (0,0) .. controls +(right:3.5cm) and
↪  +(right:3.5cm) .. (0,3)
node foreach \p in {0,0.125,...,1} [pos=\p]{\p};
```



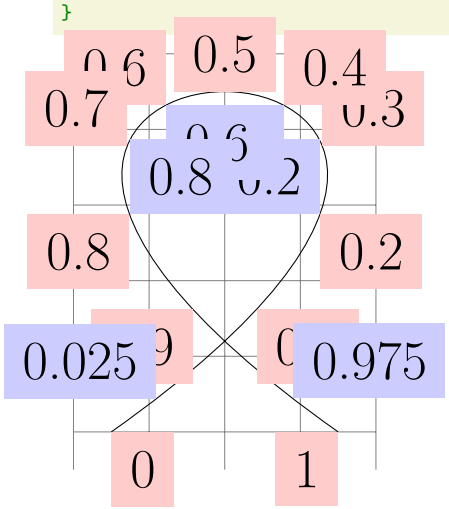

```
\tikz \draw (0,0) |- (3,1)
node[pos=0]{0} node[pos=0.5]{1/2}
↪  node[pos=0.9]{9/10};
```



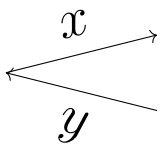

```
\begin{tikzpicture}
        [scale=.8,auto=left,every
        ↪  node/.style={circle,fill=blue!20}]
        \node (a) at (-1,-2) {a};
        \node (b) at ( 1,-2) {b};
        \node (c) at ( 2,-1) {c};
        \node (d) at ( 2, 1) {d};
        \node (e) at ( 1, 2) {e};
        \node (f) at (-1, 2) {f};
        \node (g) at (-2, 1) {g};
        \node (h) at (-2,-1) {h};
        \foreach \from/\to in
        ↪  {a/b,b/c,c/d,d/e,e/f,f/g,g/h,h/a}
        \draw [->] (\from) -- (\to)
        node[midway,fill=red!20] {\from--\to};
\end{tikzpicture}
```

→For each loop in automata package

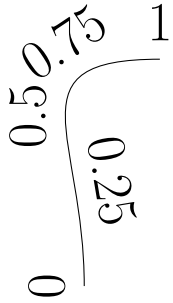
```
\foreach \variable in {list of items} {
  % Code to execute for each \variable
}
```



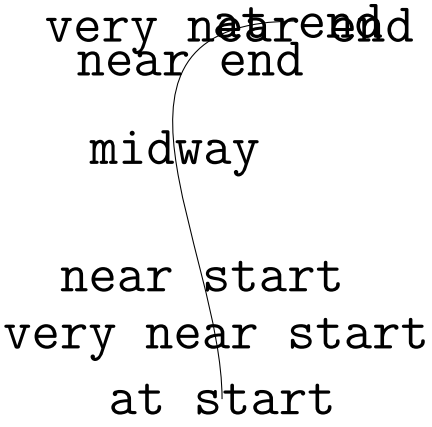

```
\begin{tikzpicture}[auto]
        \draw[help lines,use as bounding box] (0,-.5)
        ↪  grid (4,5);
        \draw (0.5,0) .. controls (9,6) and (-5,6) ..
        ↪  (3.5,0)
        node foreach \pos in
        ↪  {0,0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9,1}
                [pos=\pos,swap,fill=red!20] {\pos}
        node foreach \pos in
        ↪  {0.025,0.2,0.4,0.6,0.8,0.975}
                [pos=\pos,fill=blue!20] {\pos};
\end{tikzpicture}
```



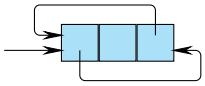

```
\begin{tikzpicture}[->]
        \draw (0,0)
        -- (2,0.5)
        ↪  node[midway,sloped,above]
        ↪  {$x$};
        \draw (2,-.5) -- (0,0)
        node[midway,sloped,below] {$y$};
\end{tikzpicture}
```



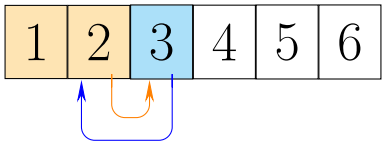

```
\tikz \draw (0,0) .. controls +(up:2cm) and
↪  +(left:2cm) .. (1,3)
node foreach \p in {0,0.25,...,1}
↪  [sloped,above,pos=\p]{\p};
```



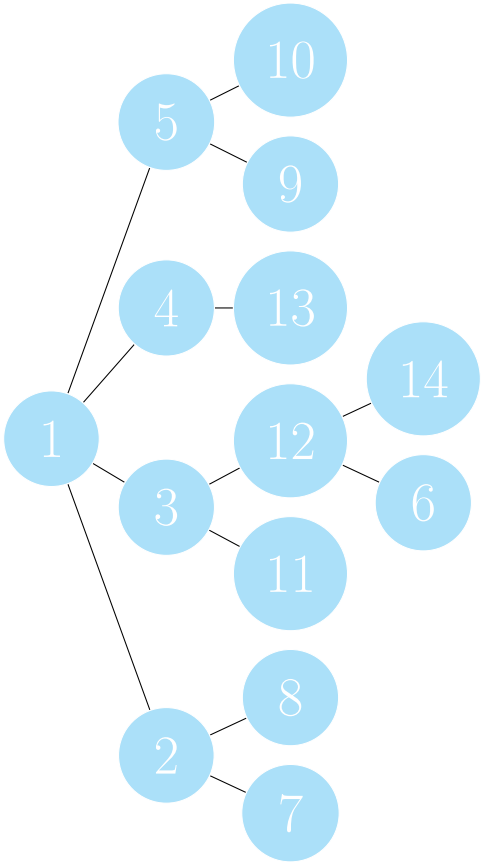

```
\tikz \draw (0,0) .. controls +(up:2cm) and +(left:3cm) .. (1,5)
node[at end]
        {\texttt{at end}}
node[very near end]
        {\texttt{very near end}}
node[near end]
        {\texttt{near end}}
node[midway]
        {\texttt{midway}}
node[near start]
        {\texttt{near start}}
node[very near start] {\texttt{very near start}}
node[at start]
        {\texttt{at start}};
```



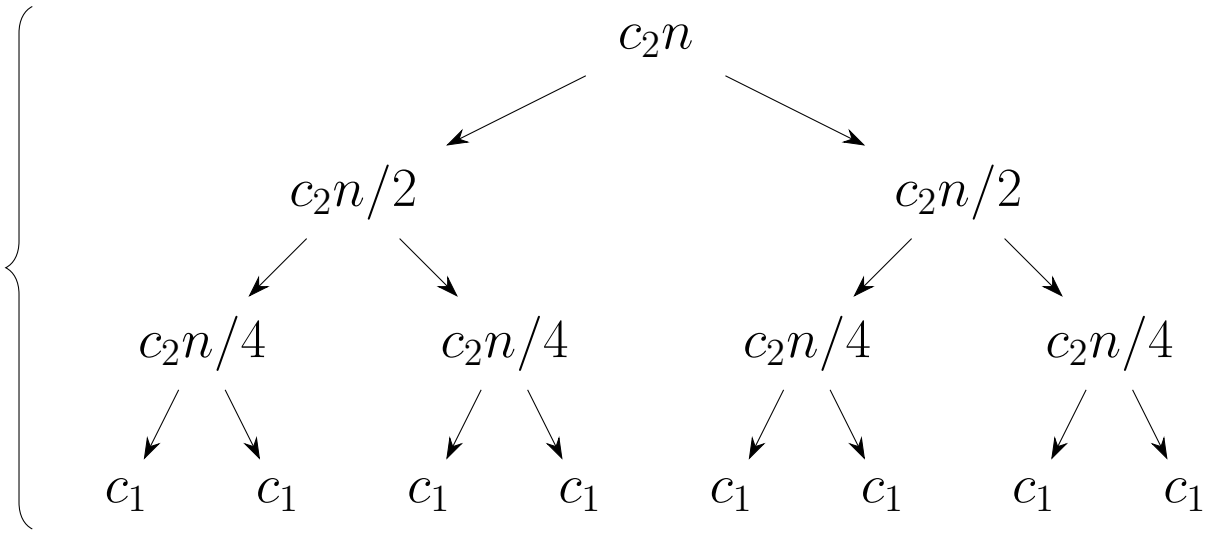
```
\definecolor{blueg}{HTML}{ABE0F9}
\begin{tikzpicture}[fill=blueg]
        \foreach \a in {0,0.5,1}{
                        \node[rectangle,draw,fill] (a_\a) at
                        ↪  (\a,0) {};
                }
        \draw[-{Stealth[length=0.3cm,width=0.12cm]},rounded
        ↪  corners=2pt] (0,-0.1) |- (1.6,-0.5) --
        ↪  (1.6,-0.1)--(1.2,-0.1);
        \draw[-{Stealth[length=0.3cm,width=0.12cm]},rounded
        ↪  corners=2pt]
        ↪  (1,0.1)|-(-0.6,0.5)--(-0.6,0.1)--(-0.2,0.1);
        \draw[-{Stealth[length=0.3cm,width=0.12cm]},rounded
        ↪  corners=2pt] (-1,-0.1)--(-0.2,-0.1);
\end{tikzpicture}
```




```
 \newcounter{cnt}
\setcounter{cnt}{0}
\begin{tikzpicture}
        \foreach \a in {0,0.83,...,4.98} {
                        \addtocounter{cnt}{1}
                        \ifdim\a pt<1pt
                                \node[rectangle, draw, fill=grapth] (a_\a) at (\a, 0) {\thecnt};
                        \else
                                \ifdim\a pt=1.66pt
                                        \node[rectangle, draw, fill=blueg] (a_\a) at (\a, 0)
                                        ↪  {\thecnt};
                                \else
                                        \node[rectangle, draw, fill=white] (a_\a) at (\a, 0)
                                        ↪  {\thecnt};
                                \fi
                        \fi
                }
        % \draw[-{Stealth[length=0.3cm,width=0.12cm]},color=orange](a_1.south)+(0,-0.2).. controls
        ↪  (1,-1.5) and (1.5,-1.5)..(1.5,-0.5);
        \draw[-{Stealth[length=0.3cm,width=0.12cm]},color=orange,rounded corners=5pt] (1,-0.6)-|
        ↪  (1,-1)-|(1.5,-0.5);
        \draw[-{Stealth[length=0.3cm,width=0.12cm]},color=blue,rounded corners=5pt]
        ↪  (1.8,-0.6)-|(1.8,-1.3)-|(0.6,-0.5);
\end{tikzpicture}
```




```
\tikz \graph [tree layout, sibling
↪  distance=1cm, nodes={circle,
↪  draw=blueg,color=white,fill=blueg},
↪  grow=right]
{
↪  1--{2--{7,8},3--{11,12--{6,14}},4--{13},5--{9,10}}
↪  };
```




```
\begin{tikzpicture}[
        level distance=2cm,
        level 1/.style={sibling distance=8cm},
        level 2/.style={sibling distance=4cm},
```

```
        level 3/.style={sibling distance=2cm},
        every node/.style={text width=2cm,  align=center},
        edge from parent/.style={draw, -{Stealth[length=3mm,width=0.2cm]}}
        ]
        % Tree structure
        \node {$c_2n$}
        child {node {$c_2n/2$}
                        child {node {$c_2n/4$}
                                        child {node {$c_1$}}
                                        child {node {$c_1$}}
                                }
                        child {node {$c_2n/4$}
                                        child {node {$c_1$}}
                                        child {node {$c_1$}}
                                }
                }
        child {node {$c_2n/2$}
                        child {node {$c_2n/4$}
                                        child {node {$c_1$}}
                                        child {node {$c_1$}}
                                }
                        child {node {$c_2n/4$}
                                        child {node {$c_1$}}
                                        child {node {$c_1$}}
                                }
                };

        % Height label on the left
        \draw[decorate,decoration={brace,mirror,amplitude=10pt}]
        (current bounding box.north west) -- (current bounding box.south west);

        % Total work at the bottom
\end{tikzpicture}
```

```
\begin{tikzpicture}
  \foreach \x/\y in {0/0, 0.5/4,
        1/8, 1.5/12} {
        \node[circle,color=white, draw=blueg, fill=blueg] at (\x, \y) {$(\x,\y)$};
    }
\end{tikzpicture}
```