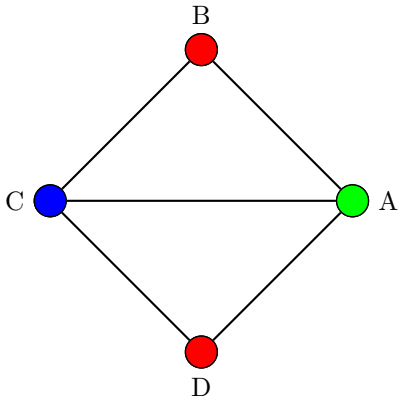
EXAMPLE 1.

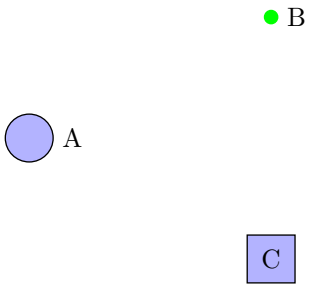


source

```
\begin{tikzpicture}
  \GraphInit[vstyle=Classic]
  \SetGraphUnit{2}
  \Vertices{circle}{A,B,C,D}
  \Edges(A,B,C,D,A,C)
  \SetVertexNoLabel
  \AddVertexColor{red}{B,D}
  \AddVertexColor{green}{A}
  \AddVertexColor{blue}{C}
\end{tikzpicture}
```

reference: http://www.hoonzis.com/graph-theory-in-latex/

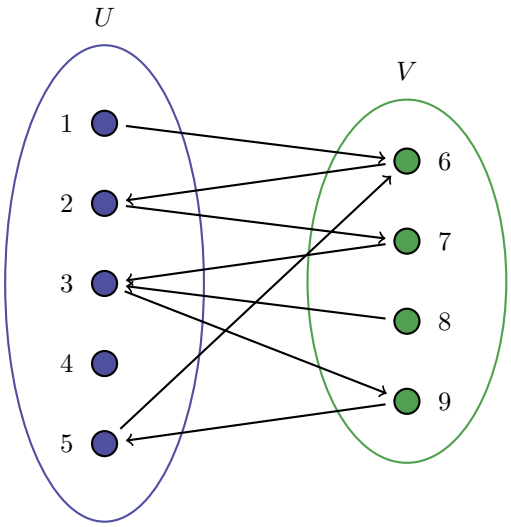
EXAMPLE 2.



source

```
\begin{tikzpicture}[scale=0.8]
  \GraphInit[vstyle=Classic]
  \SetUpVertex[FillColor=blue!30]
  \Vertex{A}
  \begin{scope}[
      VertexStyle/.append style =
      {minimum size = 5pt,
        inner sep = 0pt,
        color=green}
    ]
    \Vertex[x=4,y=2]{B}
  \end{scope}
  \tikzset{VertexStyle/.append style={rectangle}}
  \Vertex[x=4,y=-2,LabelOut=false]{C}
\end{tikzpicture}
```

EXAMPLE 3.

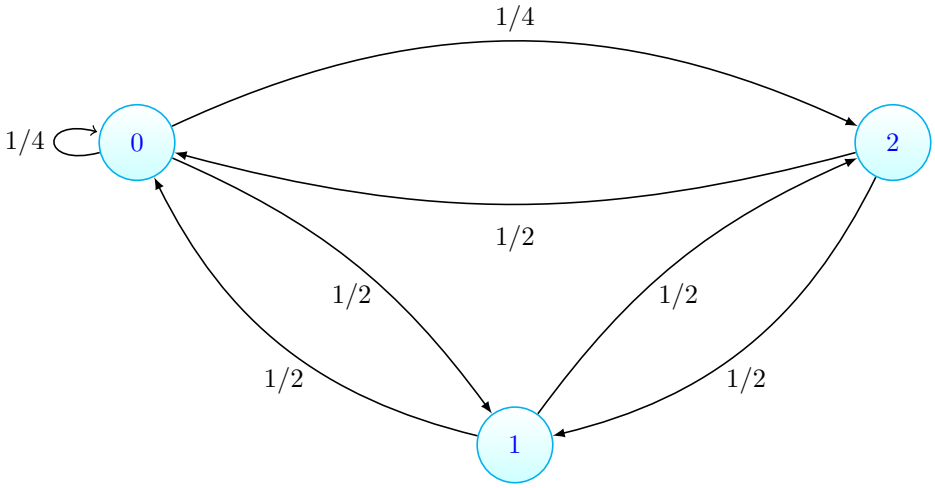


source

```
\begin{tikzpicture}[thick,
    every node/.style={draw,circle},
    fsnode/.style={fill=myblue},
    ssnode/.style={fill=mygreen},
    every fit/.style={ellipse,
      draw,inner sep=-2pt,
      text width=2cm},
    ->,shorten >= 3pt,shorten <= 3pt]
  % the vertices of U
  \begin{scope}[
      start chain=going below,
      node distance=7mm
    ]
    \foreach \i in {1,2,...,5}
    \node[fsnode,on chain] (f\i) [label=left: \i] {};
  \end{scope}

  % the vertices of V
  \begin{scope}[
      xshift=4cm,
      yshift=-0.5cm,
      start chain=going below,
      node distance=7mm
    ]
    \foreach \i in {6,7,...,9}
    \node[ssnode,on chain] (s\i) [label=right: \i] {};
  \end{scope}

  % the set U
  \node [myblue,fit=(f1) (f5),label=above:$U$] {};
  % the set V
  \node [mygreen,fit=(s6) (s9),label=above:$V$] {};

  % the edges
  \draw (f1) -- (s6); \draw (s6) -- (f2);
  \draw (f2) -- (s7); \draw (s7) -- (f3);
  \draw (s8) -- (f3); \draw (f3) -- (s9);
  \draw (s9) -- (f5); \draw (f5) -- (s6);
  \end{tikzpicture}
```

reference: http://tex.stackexchange.com/questions/15088/bipartite-graphs

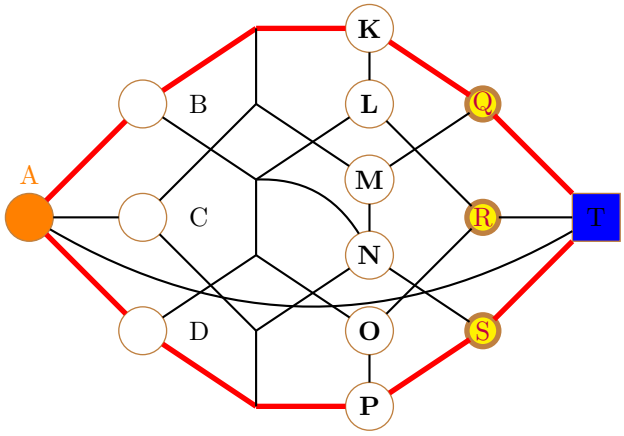
EXAMPLE 4.




```
\definecolor{processblue}{cmyk}{0.96,0,0,0}
\begin {tikzpicture}[
    -latex,auto,node distance=4 cm and 5cm,on grid,semithick,
    state/.style={circle,top color=white,bottom color=processblue!20,
      draw,processblue,text=blue,minimum width=1cm}
  ]
  \node[state] (C) {$1$};
  \node[state] (A) [above left=of C] {$0$};
  \node[state] (B) [above right =of C] {$2$};
  \path (A) edge [loop left] node[left] {$1/4$} (A);
  \path (C) edge [bend left =25] node[below =0.15 cm] {$1/2$} (A);
  \path (A) edge [bend right = -15] node[below =0.15 cm] {$1/2$} (C);
  \path (A) edge [bend left =25] node[above] {$1/4$} (B);
  \path (B) edge [bend left =15] node[below =0.15 cm] {$1/2$} (A);
  \path (C) edge [bend left =15] node[below =0.15 cm] {$1/2$} (B);
  \path (B) edge [bend right = -25] node[below =0.15 cm] {$1/2$} (C);
\end{tikzpicture}
```

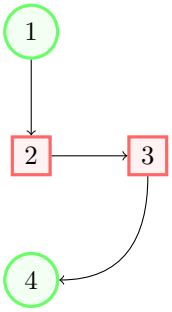
source http://www.guitex.org/home/images/doc/GuideGuIT/introingtikz.pdf

EXAMPLE 5.



reference: https://graphtheoryinlatex.wordpress.com/

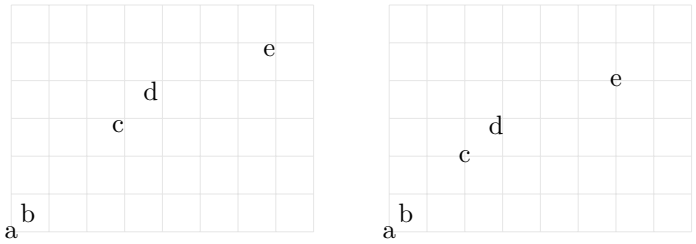
EXAMPLE 6.



source

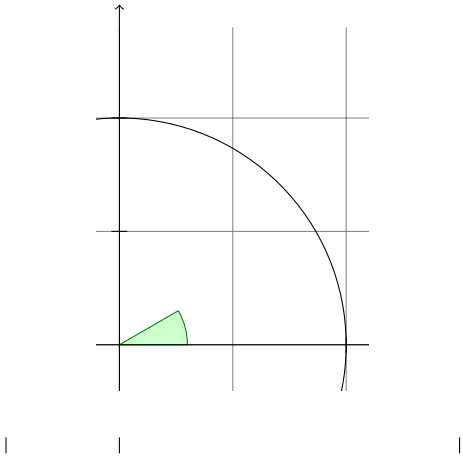
```
\tikzstyle{roundnode} = [
  circle,
  draw=green!60,
  fill=green!5,
  very thick,
  minimum size=7mm
]
\tikzstyle{squarednode} = [
  rectangle,
  draw=red!60,
  fill=red!5,
  very thick,
  minimum size=5mm
]

\begin{tikzpicture}[scale=1.2]
  %Nodes
  \node[squarednode] (maintopic) {2};
  \node[roundnode]
    (uppercircle) [above=of maintopic] {1};
  \node[squarednode]
    (rightsquare) [right=of maintopic] {3};
  \node[roundnode]
    (lowercircle) [below=of maintopic] {4};

  %Lines
  \draw[->] (uppercircle.south) -- (maintopic.north);
  \draw[->] (maintopic.east) -- (rightsquare.west);
  \draw[->]
    (rightsquare.south)
      .. controls +(down:7mm) and +(right:7mm) ..
    (lowercircle.east);
\end{tikzpicture}
```

EXAMPLE 7.



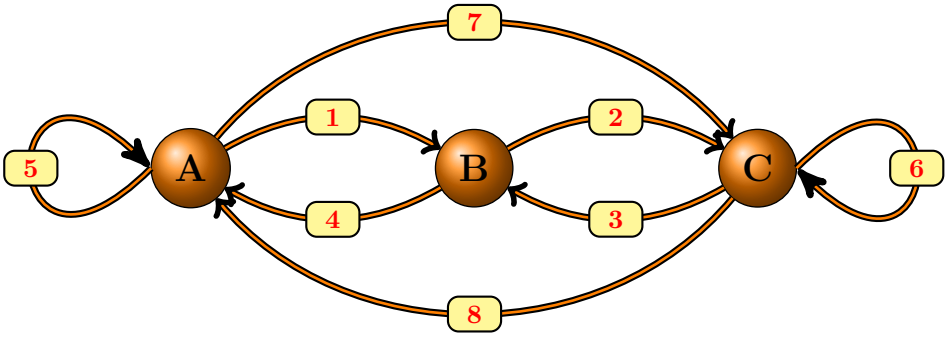
EXAMPLE 8. Hello ●
reference: pgfmanual (page 115)
http://ctan.sharelatex.com/tex-archive/graphics/pgf/base/doc/pgfmanual.pdf#page=41

EXAMPLE 9.

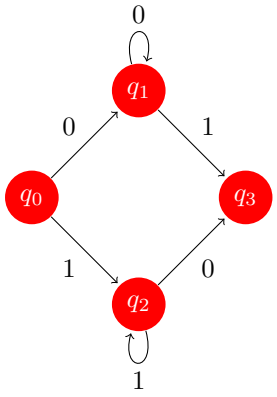


reference: pgfmanual (page 41)

EXAMPLE 10.



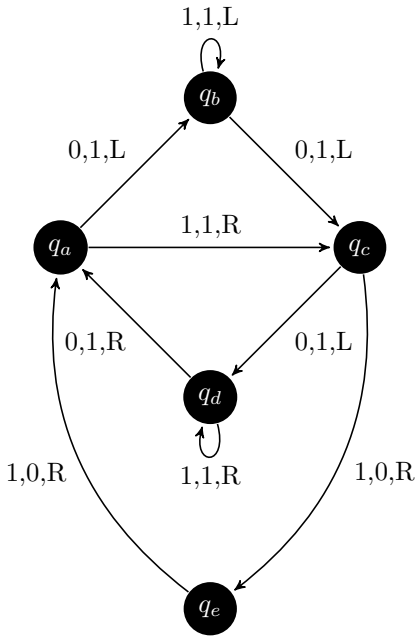
EXAMPLE 11.



source

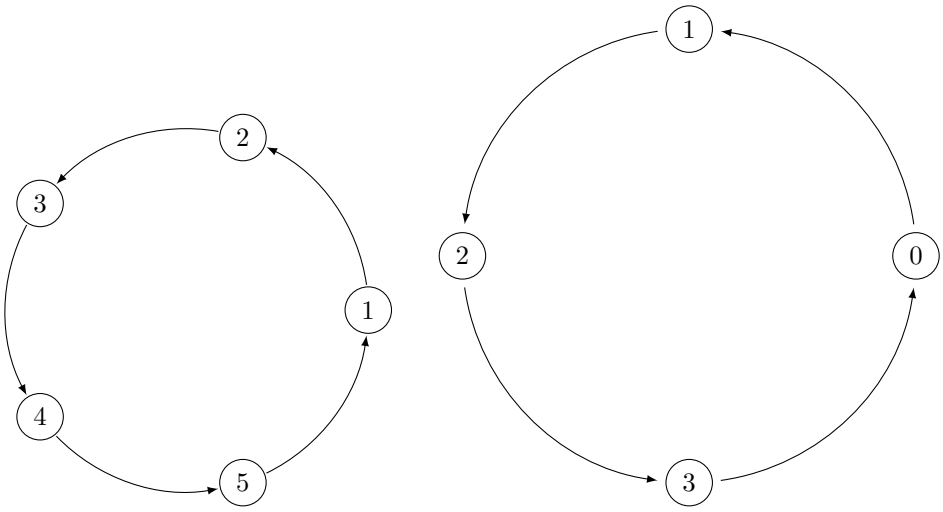
```
\begin{tikzpicture}[
  shorten >=1pt,node distance=2cm,on grid,auto,
  state/.style={fill=red,draw=none,circle,text=white}
  ]
  \node[state] (q_0) {$q_0$};
  \node[state] (q_1) [above right=of q_0] {$q_1$};
  \node[state] (q_2) [below right=of q_0] {$q_2$};
  \node[state](q_3) [below right=of q_1] {$q_3$};
  \path[->] (q_0) edge node {0} (q_1)
  edge node [swap] {1} (q_2)
  (q_1) edge node {1} (q_3)
  edge [loop above] node {0} ()
  (q_2) edge node [swap] {0} (q_3)
  edge [loop below] node {1} ();
\end{tikzpicture}
```

EXAMPLE 12.



The current candidate for the busy beaver for five states. It is presumed that this Turing machine writes a maximum number of 1s before halting among all Turing machines with five states and the tape alphabet $\{0, 1\}$. Proving this conjecture is an open research problem.

EXAMPLE 13.




```
%% First graph (with 5 vertices)
\begin{tikzpicture}[scale=0.8]
\def \n {5}
\def \radius {3cm}
\def \margin {8} % margin in angles, depends on the radius
\foreach \s in {1,...,\n}
         {
           \node[draw, circle] at ({360/\n * (\s - 1)}:\radius) {$\s$};
           \draw[->, >=latex] ({360/\n * (\s - 1)+\margin}:\radius)
           arc ({360/\n * (\s - 1)+\margin}:{360/\n * (\s)-\margin}:\radius);
         }
\end{tikzpicture}
\hskip5mm
%% -------------------------------------------------------
%% Second graph (with 4 vertices)
\begin{tikzpicture}
\def \n {4}
\def \m {3}
\def \radius {3cm}
\def \margin {8} % margin in angles, depends on the radius
\foreach \s in {0,...,\m}
         {
           \node[draw, circle] at ({360/\n * (\s)}:\radius) {$\s$};
           \draw[->, >=latex] ({360/\n * (\s)+\margin}:\radius)
           arc ({360/\n * (\s)+\margin}:{360/\n * (\s+1)-\margin}:\radius);
         }
\end{tikzpicture}
```