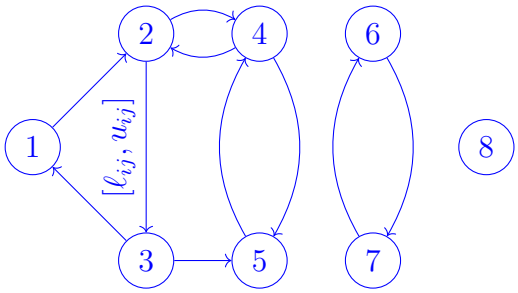
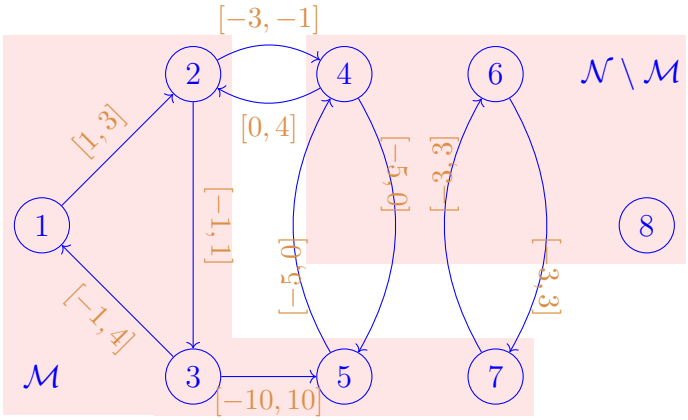
List of Figures



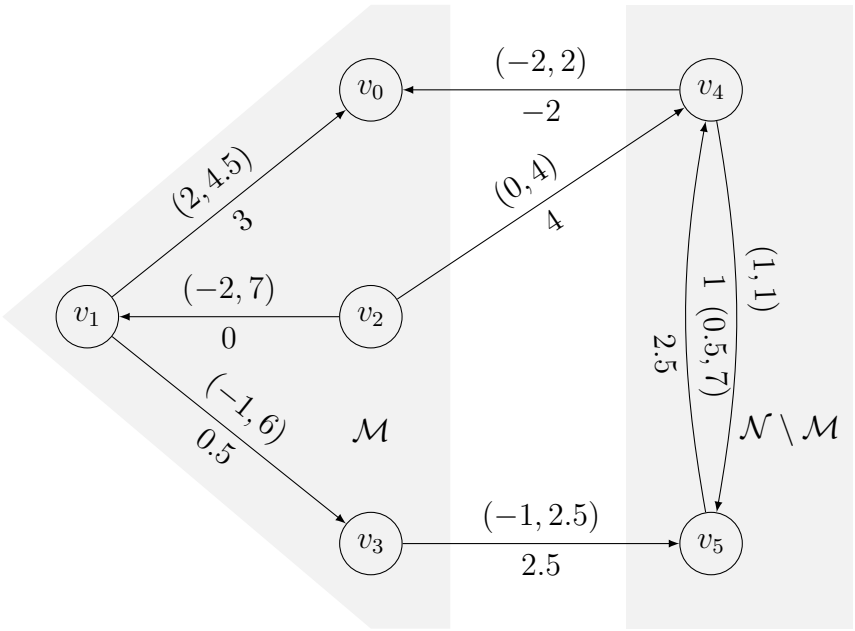

```
\begin{center}
  \begin{tikzpicture}[blue, scale=1.5]
    \node[draw,circle] (V1) at (0,1) {1};
    \node[draw,circle] (V2) at (1,2) {2};
    \node[draw,circle] (V3) at (1,0) {3};
    \node[draw,circle] (V4) at (2,2) {4};
    \node[draw,circle] (V5) at (2,0) {5};
    \node[draw,circle] (V6) at (3,2) {6};
    \node[draw,circle] (V7) at (3,0) {7};
    \node[draw,circle] (V8) at (4,1) {8};
    \draw[->] (V1) -- (V2) ;
    \draw[->] (V3) -- (V1);
    \draw[->] (V2) -- (V3) node[midway, sloped, above] {$[\ell_{ij},u_{ij}]$};
    \draw[->] (V3) -- (V5);
    \draw[->] (V2) to[bend left] (V4) ;
    \draw[->] (V4) to[bend left] (V2) ;
    \draw[->] (V5) to[bend left] (V4) ;
    \draw[->] (V4) to[bend left] (V5) ;
    \draw[->] (V7) to[bend left] (V6) ;
    \draw[->] (V6) to[bend left] (V7) ;
  \end{tikzpicture}
\end{center}
```

Figure 1: `graph-01.tex`: Anotated network



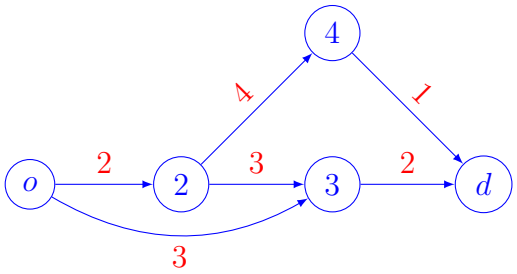

```
\definecolor{cof}{RGB}{219,144,71}
\pgfdeclarelayer{bg}
\pgfsetlayers{bg, main}
\begin{tikzpicture}[blue,scale=2]
  \node[draw,circle] (V1) at (0,1) {1};
  \node[draw,circle] (V2) at (1,2) {2};
  \node[draw,circle] (V3) at (1,0) {3};
  \node[draw,circle] (V4) at (2,2) {4};
  \node[draw,circle] (V5) at (2,0) {5};
  \node[draw,circle] (V6) at (3,2) {6};
  \node[draw,circle] (V7) at (3,0) {7};
  \node[draw,circle] (V8) at (4,1) {8};

  \draw[->] (V1) -- (V2) node[midway,above,cof,sloped] {\small$[1,3]$};
  \draw[->] (V3) -- (V1)node[midway,below,cof,sloped] {\small$[-1,4]$};
  \draw[->] (V2) -- (V3)node[midway,above,cof,sloped] {\small$[-1,1]$} ;
  \draw[->] (V3) -- (V5)node[midway,below,cof,sloped] {\small$[-10,10]$};
  \draw[->] (V2) to[bend left] node[midway,above,cof,sloped] {\small$[-3,-1]$}(V4) ;
  \draw[->] (V4) to[bend left] node[midway,below,cof,sloped] {\small$[0,4]$}(V2) ;
  \draw[->] (V5) to[bend left] node[midway,left,cof,sloped] {\small$[-5,0]$}(V4) ;
  \draw[->] (V4) to[bend left] node[midway,left,cof,sloped] {\small$[-5,0]$}(V5) ;
  \draw[->] (V7) to[bend left] node[midway,right,cof,sloped] {\small$[-3,3]$}(V6) ;
  \draw[->] (V6) to[bend left] node[midway,right,cof,sloped] {\small$[-3,3]$}(V7) ;

  \begin{pgfonlayer}{bg}
    \node[fill=red!10,fit=(V4) (V6) (V8)] {};
    \node[fill=red!10,fit=(V1) (V2) (V3)] {};
    \node[fill=red!10,fit=(V3) (V5) (V7)] {};
    \draw (3.9,2) node {$\mathcal{N}\setminus\mathcal{M}$};
    \draw (0,0) node {$\mathcal{M}$};
  \end{pgfonlayer}

\end{tikzpicture}
```

Figure 2: `graph-02.tex`: Network with set of nodes



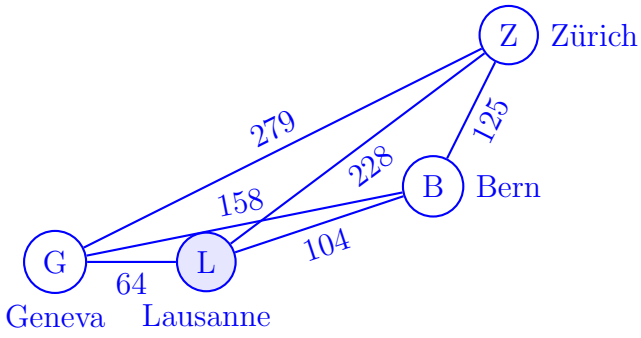

```
\begin{tikzpicture}[scale = 1.5]
  \fill[
    opacity=0.2,
    lightgray!20
  ] (-1.75, 0) -- (1.5, 2.75) -- (2.2, 2.75) -- (2.2, -2.75) -- (1.5, -2.75) -- cycle  ;
  \fill[
    opacity=0.2,
    lightgray!20
  ] (3.75, 2.75) -- (5.75, 2.75) -- (5.75, -2.75) -- (3.75, -2.75) -- cycle  ;

  \draw node[circle, draw] (v0) at (1.5, 2) {$v_0$};
  \draw node[circle, draw] (v2) at (1.5, 0) {$v_2$};
  \draw node[circle, draw] (v3) at (1.5, -2) {$v_3$};
  \draw node[circle, draw] (v1) at (-1, 0) {$v_1$};
  \draw node[circle, draw] (v4) at (4.5, 2) {$v_4$};
  \draw node[circle, draw] (v5) at (4.5, -2) {$v_5$};

  \draw[-latex] (v1) -- (v0) node[
    midway,
    sloped,
    above
  ] {$(2, 4.5)$} node[midway, sloped, below] {$3$};
  \draw[-latex] (v2) -- (v1)
    node[midway, above] {$(-2, 7)$}
    node[midway, below] {$0$};

  \draw[-latex] (v3) -- (v5)
    node[midway, above] {$(-1, 2.5)$}
    node[midway, below] {$2.5$};

  \draw[-latex] (v2) -- (v4)
    node[midway, sloped, above] {$(0, 4)$}
    node[midway, sloped, below] {$4$};

  \draw[-latex] (v4) to[bend left=10]
    node[midway, sloped, above, pos=0.4] {$(1, 1)$}
    node[midway, sloped, below, pos=0.4] {$1$}(v5) ;

  \draw[-latex] (v5) to[bend left=10]
    node[midway, sloped, above, pos=0.4] {$(0.5, 7)$}
    node[midway, sloped, below, pos=0.4] {$2.5$}(v4);

  \draw[-latex] (v1) -- (v3)
    node [midway, sloped, above] {$(-1, 6)$}
    node [midway, sloped, below] {$0.5$};

  \draw[-latex] (v4) -- (v0)
    node[midway, above] {$(-2, 2)$}
    node[midway, below] {$-2$};

  \node at (1.5, -1) {$\mathcal{M}$};
  \node at (5.2, -1) {$\mathcal{N} \setminus \mathcal{M}$};

\end{tikzpicture}
```


Figure 3: `graph-13.tex`: Network with set of nodes



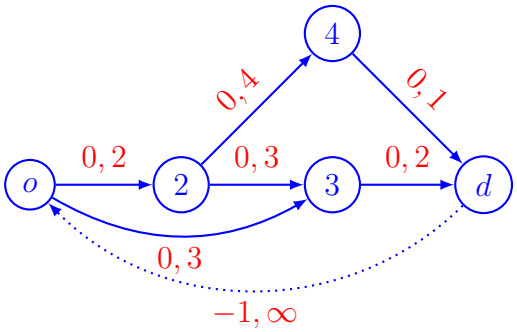

```
\begin{tikzpicture}[blue, scale=2]
  \node[draw, circle] (V1) at (0,0) {$o$};
  \node[draw, circle] (V2) at (1,0) {$2$};
  \node[draw, circle] (V3) at (2,0) {$3$};
  \node[draw, circle] (V4) at (2,1) {$4$};
  \node[draw, circle] (V5) at (3,0) {$d$};

  \draw[-latex] (V1) -- (V2) node[midway,above,red] {$2$};
  \draw[-latex] (V2) -- (V3) node[midway,above,red] {$3$};
  \draw[-latex] (V3) -- (V5) node[midway,above,red] {$2$};
  \draw[-latex] (V2) -- (V4) node[midway,above,sloped,red] {$4$};
  \draw[-latex] (V1) to[bend right] node[midway,below,red] {$3$} (V3) ;
  \draw[-latex] (V4) -- (V5) node[midway,above,sloped,red] {$1$};
\end{tikzpicture}
```

Figure 4: `graph-03.tex`: Simple network with node and link labels



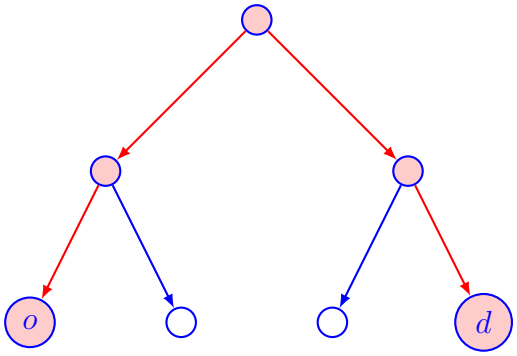

```
\begin{tikzpicture}[blue,thick]
  \node (NG) at (0, 0) [circle, draw, label=below:Geneva] {G} ;
  \node (NL) at (2, 0) [circle, fill=blue!10, draw, label=below:Lausanne] {L} ;
  \node (NB) at (5, 1) [circle, draw, label=right:Bern] {B} ;
  \node (NZ) at (6, 3) [circle, draw, label=right:Z\"urich] {Z} ;

  \draw (NG) -- (NL) node[midway, below] {$64$} ;
  \draw (NG) -- (NB) node[midway, above, sloped] {$158$} ;
  \draw (NG) -- (NZ) node[midway, above, sloped] {$279$} ;
  \draw (NL) -- (NB) node[midway, below, sloped] {$104$} ;
  \draw (NL) -- (NZ) node[midway, below, sloped] {$228$} ;
  \draw (NZ) -- (NB) node[midway, below, sloped] {$125$} ;
\end{tikzpicture}
```

Figure 5: `graph-12.tex`: Network with node and link labels



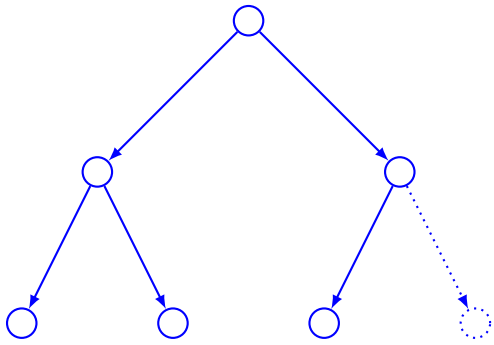

```
\begin{tikzpicture}[blue,thick,scale=2]
  \node[draw, circle] (V1) at (0, 0) {$o$};
  \node[draw, circle] (V2) at (1, 0) {$2$};
  \node[draw, circle] (V3) at (2, 0) {$3$};
  \node[draw, circle] (V4) at (2, 1) {$4$};
  \node[draw, circle] (V5) at (3, 0) {$d$};

  \draw[-latex] (V1) -- (V2) node[midway,above,red] {$0, 2$};
  \draw[-latex] (V2) -- (V3) node[midway,above,red] {$0, 3$};
  \draw[-latex] (V3) -- (V5) node[midway,above,red] {$0, 2$};
  \draw[-latex] (V2) -- (V4) node[midway,above,sloped,red] {$0, 4$};
  \draw[-latex] (V1) to[bend right] node[midway,below,red] {$0, 3$} (V3) ;
  \draw[-latex] (V4) -- (V5) node[midway,above,sloped,red] {$0, 1$};

  \draw[-latex,dotted] (V5) to[bend left=45, -|] node[midway, below, red] {$-1,\infty$} (V1) ;
\end{tikzpicture}
```

Figure 6: `graph-04.tex`: Simple network with bending and doted link



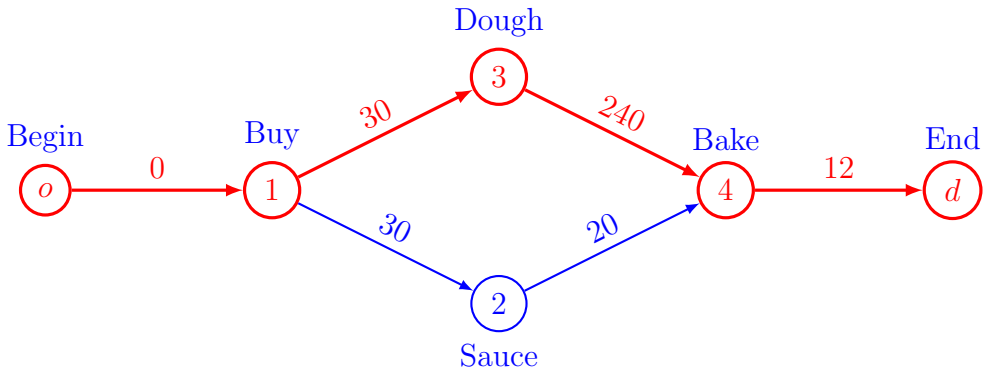

```
\begin{tikzpicture}[blue, thick]
  \node[draw, circle, fill=red!20] (V1) at (3, 4) {};
  \node[draw, circle, fill=red!20] (V2) at (1, 2) {};
  \node[draw, circle, fill=red!20] (V3) at (5, 2) {};
  \node[draw, circle, fill=red!20] (V4) at (0, 0) {$o$};
  \node[draw, circle] (V5) at (2, 0) {};
  \node[draw, circle] (V6) at (4, 0) {};
  \node[draw, circle, fill=red!20] (V7) at (6, 0) {$d$};

  \draw[-latex, red] (V1) -- (V2);
  \draw[-latex, red] (V1) -- (V3);
  \draw[-latex, red] (V2) -- (V4);
  \draw[-latex] (V2) -- (V5);
  \draw[-latex] (V3) -- (V6);
  \draw[-latex, red] (V3) -- (V7);
\end{tikzpicture}
```

Figure 7: `graph-05.tex`: Tree with color and node labels



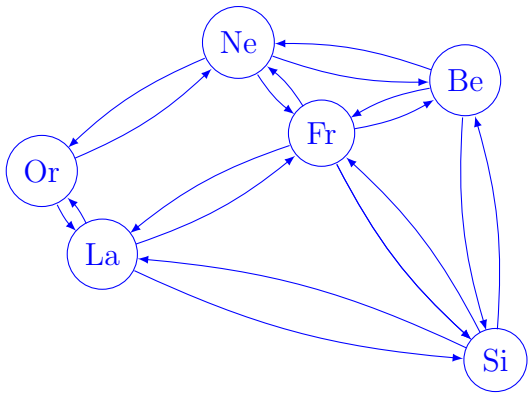
```
\begin{tikzpicture}[blue, thick]
  \node[draw, circle] (V1) at (3, 4) {};
  \node[draw, circle] (V2) at (1, 2) {};
  \node[draw, circle] (V3) at (5, 2) {};
  \node[draw, circle] (V4) at (0, 0) {};
  \node[draw, circle] (V5) at (2, 0) {};
  \node[draw, circle] (V6) at (4, 0) {};
  \node[draw, dotted, circle] (V7) at (6, 0) {};

  \draw[-latex] (V1) -- (V2);
  \draw[-latex] (V1) -- (V3);
  \draw[-latex] (V2) -- (V4);
  \draw[-latex] (V2) -- (V5);
  \draw[-latex] (V3) -- (V6);
  \draw[-latex, dotted] (V3) -- (V7);
\end{tikzpicture}
```

Figure 8: `graph-06.tex`: Tree with dotted link



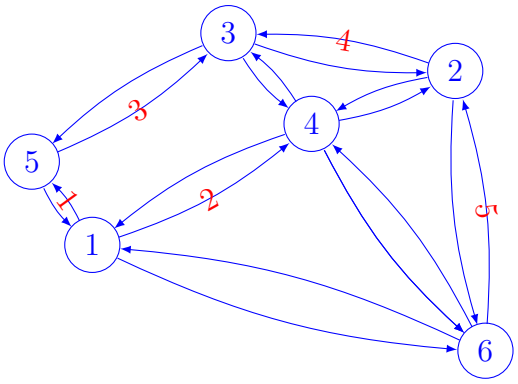

```
\begin{tikzpicture}[blue, thick, scale=1.5]

  \node (N01) at (0, 1) [circle,  draw, label=Begin, red, very thick] {$o$} ;
  \node (N02) at (2, 1) [circle,  draw, label=Buy, red, very thick] {$1$} ;
  \node (N03) at (4, 0) [circle,  draw, label=below:Sauce] {$2$} ;
  \node (N04) at (4, 2) [circle,  draw, label=Dough, red, very thick] {$3$} ;
  \node (N05) at (6, 1) [circle,  draw, label=Bake, red, very thick] {$4$} ;
  \node (N06) at (8, 1) [circle,  draw, label=End, red, very thick] {$d$} ;

  \draw[-latex, red, very thick] (N01) -- (N02) node[midway, above] {$0$} ;
  \draw[-latex] (N02) -- (N03) node[midway, above, sloped] {$30$} ;
  \draw[-latex, red, very thick] (N02) -- (N04) node[midway, above, sloped] {$30$} ;
  \draw[-latex] (N03) -- (N05) node[midway, above, sloped] {$20$} ;
  \draw[-latex, red, very thick] (N04) -- (N05) node[midway, above, sloped] {$240$} ;
  \draw[-latex, red, very thick] (N05) -- (N06) node[midway, above] {$12$} ;

\end{tikzpicture}
```

Figure 9: `graph-07.tex`: Network with two node labels



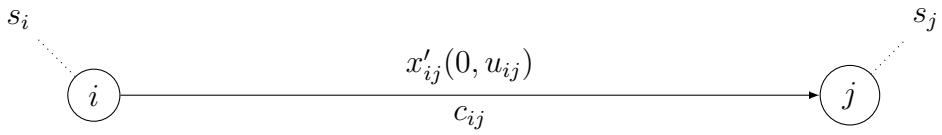

```
\begin{tikzpicture}[blue, scale=6]
  \node[draw, circle] (LA) at (6.6667, 46.5333) {La};
  \node[draw, circle] (BE) at (7.4667, 46.9167) {Be};
  \node[draw, circle] (NE) at (6.9667, 47){Ne};
  \node[draw, circle] (FR) at (7.15, 46.8) {Fr};
  \node[draw, circle] (OR) at (6.5333, 46.7167) {Or};
  \node[draw, circle] (SI) at (7.5333, 46.3) {Si};

  \draw[-latex] (LA) to[bend right=10] (OR) ;
  \draw[-latex] (LA) to[bend right=10] (FR) ;
  \draw[-latex] (LA) to[bend right=10] (SI) ;
  \draw[-latex] (BE) to[bend right=10] (NE) ;
  \draw[-latex] (BE) to[bend right=10] (FR) ;
  \draw[-latex] (BE) to[bend right=10] (SI) ;
  \draw[-latex] (NE) to[bend right=10] (OR) ;
  \draw[-latex] (NE) to[bend right=10] (FR) ;
  \draw[-latex] (NE) to[bend right=10] (BE) ;
  \draw[-latex] (FR) to[bend right=10] (LA) ;
  \draw[-latex] (FR) to[bend right=10] (NE) ;
  \draw[-latex] (FR) to[bend right=10] (BE) ;
  \draw[-latex] (FR) to[bend right=10] (SI) ;
  \draw[-latex] (FR) to[bend right=10] (SI) ;
  \draw[-latex] (OR) to[bend right=10] (NE) ;
  \draw[-latex] (OR) to[bend right=10] (LA) ;
  \draw[-latex] (SI) to[bend right=10] (LA) ;
  \draw[-latex] (SI) to[bend right=10] (FR) ;
  \draw[-latex] (SI) to[bend right=10] (BE) ;
\end{tikzpicture}
```

Figure 10: `graph-08.tex`: Network with double links



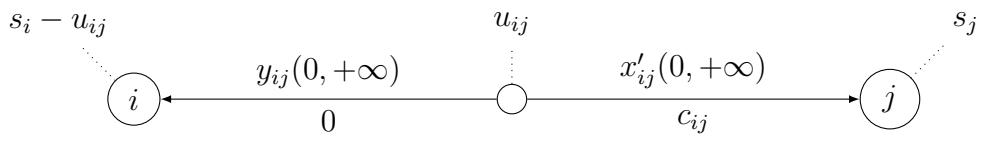

```
\begin{tikzpicture}[blue, scale=6]
  \node[draw, circle] (LA) at (6.6667, 46.5333) {1};
  \node[draw, circle] (BE) at (7.4667, 46.9167) {2};
  \node[draw, circle] (NE) at  (6.9667, 47){3};
  \node[draw, circle] (FR) at (7.15, 46.8) {4};
  \node[draw, circle] (OR) at (6.5333, 46.7167) {5};
  \node[draw, circle] (SI) at (7.5333, 46.3) {6};

  \draw[-latex] (LA) to[bend right=10] node[midway, sloped, red] {1}(OR) ;
  \draw[-latex] (LA) to[bend right=10] node[midway, sloped, red] {2}(FR) ;
  \draw[-latex] (LA) to[bend right=10] (SI) ;
  \draw[-latex] (BE) to[bend right=10] node[midway, sloped, red] {4}(NE) ;
  \draw[-latex] (BE) to[bend right=10] (FR) ;
  \draw[-latex] (BE) to[bend right=10] (SI) ;
  \draw[-latex] (NE) to[bend right=10] (OR) ;
  \draw[-latex] (NE) to[bend right=10] (FR) ;
  \draw[-latex] (NE) to[bend right=10] (BE) ;
  \draw[-latex] (FR) to[bend right=10] (LA) ;
  \draw[-latex] (FR) to[bend right=10] (NE) ;
  \draw[-latex] (FR) to[bend right=10] (BE) ;
  \draw[-latex] (FR) to[bend right=10] (SI) ;
  \draw[-latex] (FR) to[bend right=10] (SI) ;
  \draw[-latex] (OR) to[bend right=10] node[midway, sloped, red] {3}(NE) ;
  \draw[-latex] (OR) to[bend right=10] (LA) ;
  \draw[-latex] (SI) to[bend right=10] (LA) ;
  \draw[-latex] (SI) to[bend right=10] (FR) ;
  \draw[-latex] (SI) to[bend right=10] node[midway, sloped, red] {5}(BE) ;
\end{tikzpicture}
```

Figure 11: `graph-11.tex`: Network with double links and labels



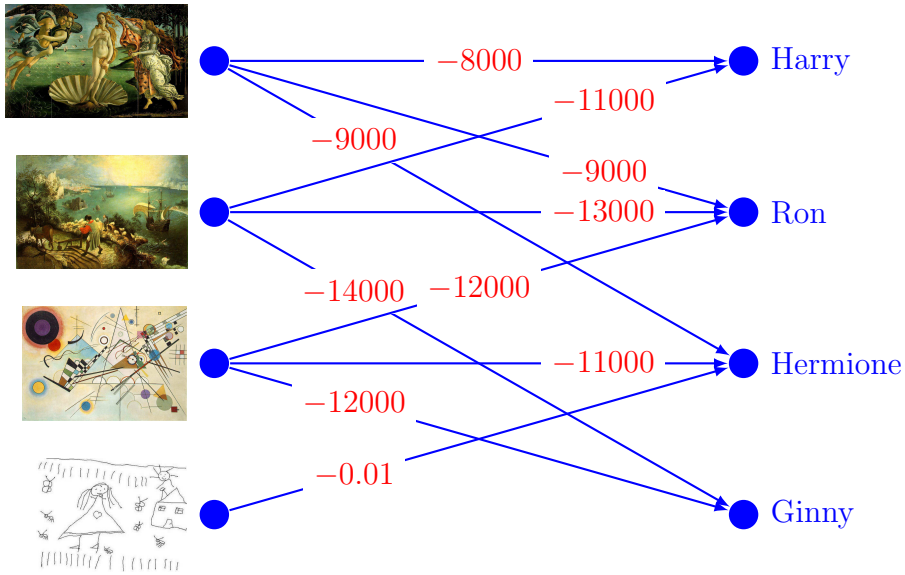

```
\begin{tikzpicture}
  \node[draw, circle] (Vi) at (0, 0) {$i$} ;
  \node[draw, circle] (Vj) at (10, 0) {$j$} ;
  \node (si) at (-1, 1) {$s_i$} ;
  \node (sj) at (11, 1) {$s_j$} ;
  \draw[dotted] (si) -- (Vi) ;
  \draw[dotted] (sj) -- (Vj) ;
  \draw[-latex] (Vi) -- (Vj) node[midway, above]
       {$x'_{ij}(0, u_{ij})$} node[midway, below] {$c_{ij}$} ;
\end{tikzpicture}
```

Figure 12: `graph-09.tex`: One annotated link



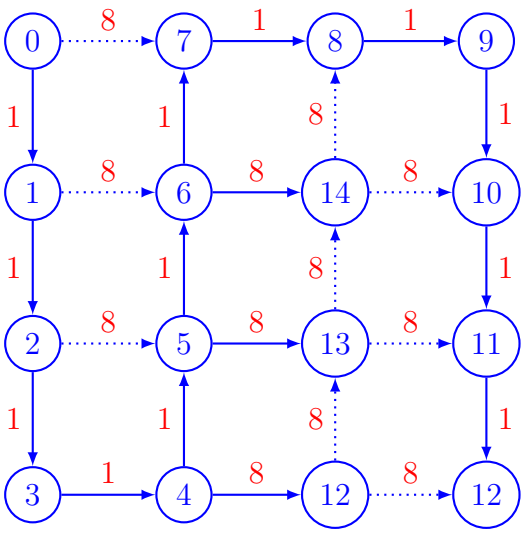

```
\begin{tikzpicture}
  \node[draw, circle] (Vi) at (0, 0) {$i$} ;
  \node[draw, circle] (Vj) at (10, 0) {$j$} ;
  \node[draw, circle] (slack) at (5, 0) {} ;
  \node (demand) at (5, 1) {$u_{ij}$} ;
  \node (si) at (-1, 1) {$s_i-u_{ij}$} ;
  \node (sj) at (11, 1) {$s_j$} ;
  \draw[dotted] (si) -- (Vi) ;
  \draw[dotted] (sj) -- (Vj) ;
  \draw[dotted] (slack) -- (demand) ;
  \draw[-latex] (slack) -- (Vi) node[midway, above]
       {$y_{ij}(0, +\infty)$} node[midway, below] {$0$} ;
  \draw[-latex] (slack) -- (Vj) node[midway, above]
       {$x'_{ij}(0, +\infty)$} node[midway, below] {$c_{ij}$} ;
\end{tikzpicture}
```

Figure 13: `graph-10`.tex: Two annotated links



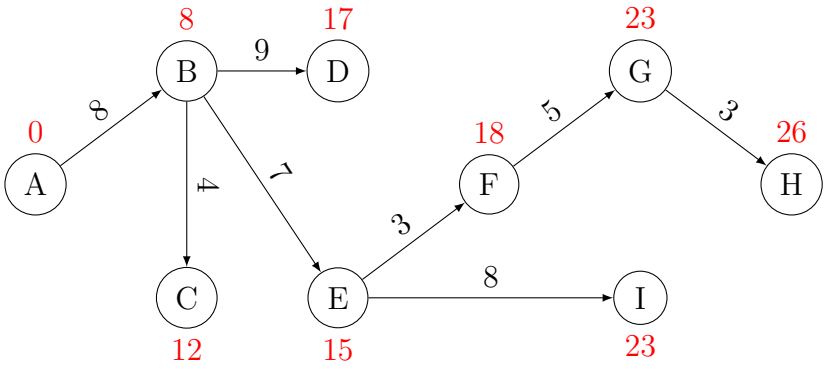

```
\begin{tikzpicture}[blue, thick]
  \node (Bier) at (0, 0) [
    circle,
    fill,
    label=left:\epsfig{figure=Bierlaire1971, height=1.5cm}
  ] {};
  \node (Kand) at (0, 2) [
    circle,
    fill,
    label=left:\epsfig{figure=kandinski1923, height=1.5cm}
  ] {};
  \node (Brue) at (0, 4) [
    circle,
    fill,
    label=left:\epsfig{figure=Bruegel1558, height=1.5cm}
  ] {};
  \node (Bott) at (0, 6) [
    circle,
    fill,
    label=left:\epsfig{figure=botticelli1485, height=1.5cm}
  ] {};
  \node (Ginn) at (7, 0) [
    circle,
    fill,
    label=right:Ginny
  ] {};
  \node (Herm) at (7, 2) [
    circle,
    fill,
    label=right:Hermione
  ] {};
  \node (Ron) at (7, 4) [
    circle,
    fill,
    label=right:Ron
  ] {};
  \node (Harr) at (7, 6) [
    circle,
    fill,
    label=right:Harry
  ] {};

  \draw[->, -latex] (Bott) -- (Harr) node[midway, text=red, fill=white] {$-8000$} ;
  \draw[->, -latex] (Bott) -- (Ron) node[near end, text=red, fill=white] {$-9000$} ;
  \draw[->, -latex] (Bott) -- (Herm) node[near start, text=red, fill=white] {$-9000$} ;
  \draw[->, -latex] (Brue) -- (Harr) node[near end, text=red, fill=white] {$-11000$} ;
  \draw[->, -latex] (Brue) -- (Ron) node[near end, text=red, fill=white] {$-13000$} ;
  \draw[->, -latex] (Brue) -- (Ginn) node[near start, text=red, fill=white] {$-14000$} ;
  \draw[->, -latex] (Kand) -- (Ron) node[midway, text=red, fill=white] {$-12000$} ;
  \draw[->, -latex] (Kand) -- (Herm) node[near end, text=red, fill=white] {$-11000$} ;
  \draw[->, -latex] (Kand) -- (Ginn) node[near start, text=red, fill=white] {$-12000$} ;
  \draw[->, -latex] (Bier) -- (Herm) node[near start, text=red, fill=white] {$-0.01$} ;
\end{tikzpicture}
```


Figure 14: `graph-14.tex`: Network with pictures



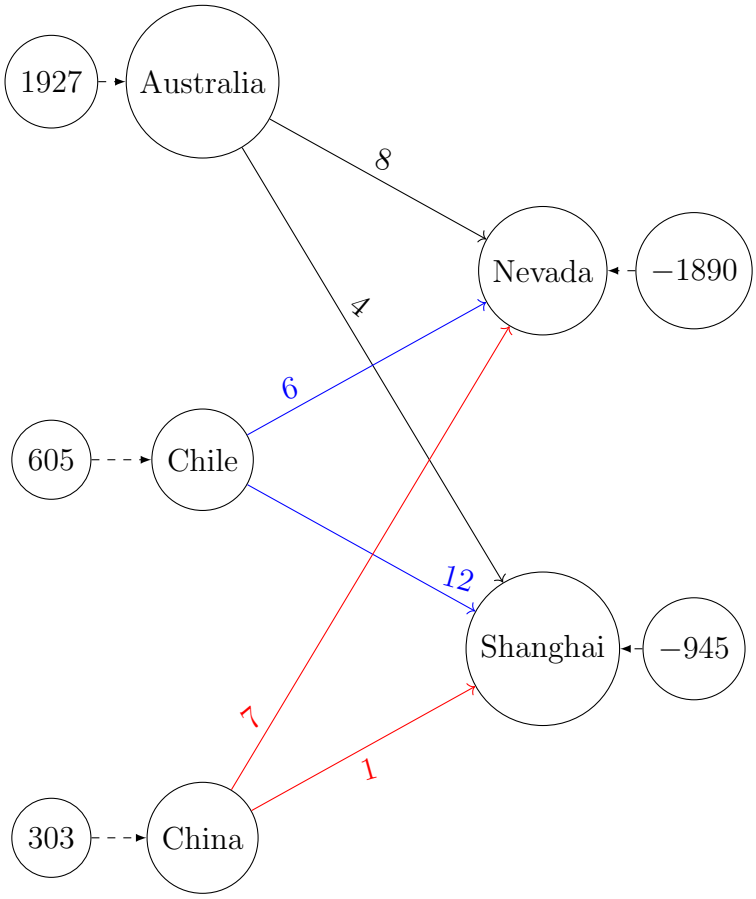

```
\begin{tikzpicture}[blue, thick]
  \node (N01) at (0, 6) [circle, draw] {0} ;
  \node (N02) at (2, 6) [circle, draw] {7} ;
  \node (N03) at (4, 6) [circle, draw] {8} ;
  \node (N04) at (6, 6) [circle, draw] {9} ;
  \node (N05) at (0, 4) [circle, draw] {1} ;
  \node (N06) at (2, 4) [circle, draw] {6} ;
  \node (N07) at (4, 4) [circle, draw] {14} ;
  \node (N08) at (6, 4) [circle, draw] {10} ;
  \node (N09) at (0, 2) [circle, draw] {2} ;
  \node (N10) at (2, 2) [circle, draw] {5} ;
  \node (N11) at (4, 2) [circle, draw] {13} ;
  \node (N12) at (6, 2) [circle, draw] {11} ;
  \node (N13) at (0, 0) [circle, draw] {3} ;
  \node (N14) at (2, 0) [circle, draw] {4} ;
  \node (N15) at (4, 0) [circle, draw] {12} ;
  \node (N16) at (6, 0) [circle, draw] {12} ;

  \draw[-latex, dotted] (N01) -- (N02) node[midway, red, above] {$8$} ;
  \draw[-latex] (N01) -- (N05) node[midway, red, left] {$1$} ;
  \draw[-latex] (N02) -- (N03) node[midway, red, above] {$1$} ;
  \draw[-latex] (N03) -- (N04) node[midway, red, above] {$1$} ;
  \draw[-latex] (N04) -- (N08) node[midway, red, right] {$1$} ;
  \draw[-latex, dotted] (N05) -- (N06) node[midway, red, above] {$8$} ;
  \draw[-latex] (N05) -- (N09) node[midway, red, left] {$1$} ;
  \draw[-latex] (N06) -- (N07) node[midway, red, above] {$8$} ;
  \draw[-latex] (N06) -- (N02) node[midway, red, left] {$1$} ;
  \draw[-latex, dotted] (N07) -- (N08) node[midway, red, above] {$8$} ;
  \draw[-latex, dotted] (N07) -- (N03) node[midway, red, left] {$8$} ;
  \draw[-latex] (N08) -- (N12) node[midway, red, right] {$1$} ;
  \draw[-latex, dotted] (N09) -- (N10) node[midway, red, above] {$8$} ;
  \draw[-latex] (N09) -- (N13) node[midway, red, left] {$1$} ;
  \draw[-latex] (N10) -- (N11) node[midway, red, above] {$8$} ;
  \draw[-latex] (N10) -- (N06) node[midway, red, left] {$1$} ;
  \draw[-latex, dotted] (N11) -- (N12) node[midway, red, above] {$8$} ;
  \draw[-latex, dotted] (N11) -- (N07) node[midway, red, left] {$8$} ;
  \draw[-latex] (N12) -- (N16) node[midway, red, right] {$1$} ;
  \draw[-latex] (N13) -- (N14) node[midway, red, above] {$1$} ;
  \draw[-latex] (N14) -- (N15) node[midway, red, above] {$8$} ;
  \draw[-latex] (N14) -- (N10) node[midway, red, left] {$1$} ;
  \draw[-latex, dotted] (N15) -- (N16) node[midway, red, above] {$8$} ;
  \draw[-latex, dotted] (N15) -- (N11) node[midway, red, left] {$8$} ;
\end{tikzpicture}
```

Figure 15: `graph-15.tex`: Grid network



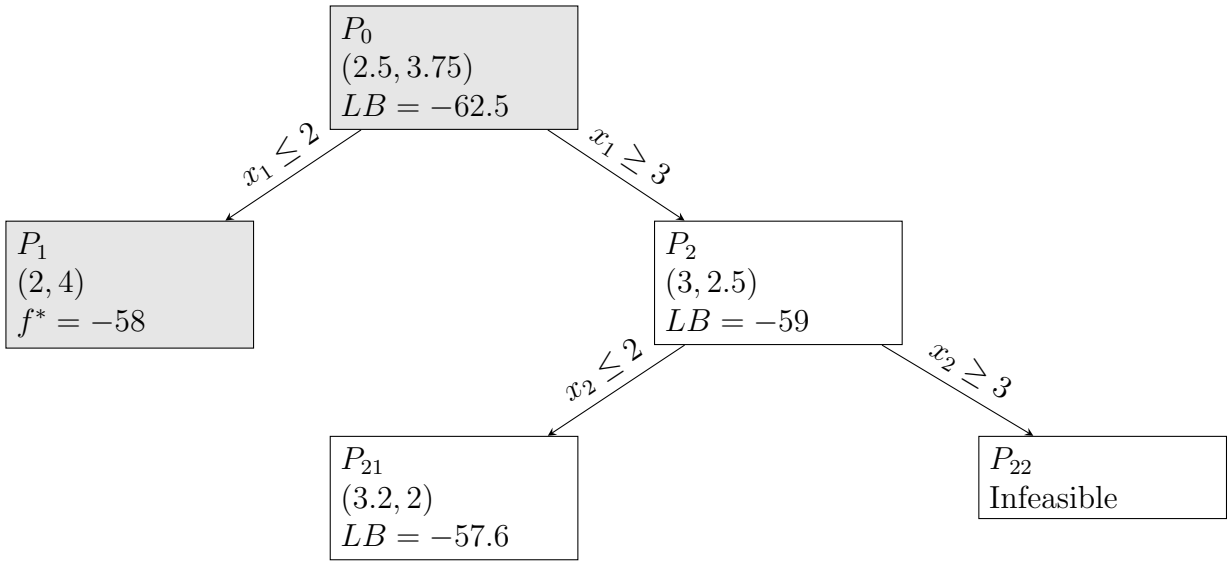

```
\begin{tikzpicture}
  \node[shape=circle, draw=black, label={[red]$0$}] (1) at (0, 0) {A};
  \node[shape=circle, draw=black, label={[red]$8$}] (2) at (2, 1.5) {B};
  \node[shape=circle, draw=black, label={[red]below:$12$}] (3) at (2, -1.5) {C};
  \node[shape=circle, draw=black, label={[red]$17$}] (4) at (4, 1.5) {D};
  \node[shape=circle, draw=black, label={[red]below:$15$}] (5) at (4, -1.5) {E};
  \node[shape=circle, draw=black, label={[red]$18$}] (6) at (6, 0) {F} ;
  \node[shape=circle, draw=black, label={[red]$23$}] (7) at (8, 1.5) {G};
  \node[shape=circle, draw=black, label={[red]$26$}] (8) at (10, 0) {H};
  \node[shape=circle, draw=black, label={[red]below:$23$}] (9) at (8, -1.5) {I} ;
  \draw[-latex] (1) -- (2) node[midway, sloped, above] {8};
  \draw[-latex] (2) -- (4) node[midway, sloped, above] {9};
  \draw[-latex] (2) -- (5) node[midway, sloped, above] {7};
  \draw[-latex] (2) -- (3) node[midway, sloped, above] {4};
  \draw[-latex] (5) -- (6) node[midway, sloped, above] {3};
  \draw[-latex] (5) -- (9) node[midway, sloped, above] {8};
  \draw[-latex] (6) -- (7) node[midway, sloped, above] {5};
  \draw[-latex] (7) -- (8) node[midway, sloped, above] {3};
\end{tikzpicture}
```

Figure 16: `graph-16.tex`: PERT network




```
\begin{tikzpicture}[xscale=0.5]
  \def\x{1}
  \def\z{10}
  \def\y{2.5}

  \node[draw=black, circle] (AUS) at (\x, 0) {Australia};
  \node[draw=black, circle] (CHI) at (\x, -2 * \y) {Chile};
  \node[draw=black, circle] (CHINA) at (\x, -4 * \y) {China};

  \node[draw=black, circle] (Nevada) at (\z, -1 * \y) {Nevada};
  \node[draw=black, circle] (Shanghai) at (\z, -3 * \y) {Shanghai};

  \draw[->] (AUS) -- (Nevada) node [pos=0.5, above, sloped] {8};
  \draw[->] (AUS) -- (Shanghai) node [pos=0.4, above, sloped] {4};
  \draw[->] (CHI)[blue] -- (Nevada) node [pos=0.2, above, sloped] {6};
  \draw[->] (CHI)[blue] -- (Shanghai) node [pos=0.9, above, sloped] {12};
  \draw[->] (CHINA)[red] -- (Nevada) node [pos=0.12, above, sloped] {7};
  \draw[->] (CHINA)[red] -- (Shanghai) node [pos=0.5, below, sloped] {1};

  \draw node[circle, draw] (1) at (-3, 0 * \y) {$1927$};
  \draw node[circle, draw] (2) at (-3, -2 * \y) {$605$};
  \draw node[circle, draw] (3) at (-3, -4 * \y) {$303$};
  \draw node[circle, draw] (4) at (14, -1 * \y) {$-1890$};
  \draw node[circle, draw] (5) at (14, -3 * \y) {$-945$};

  \draw[dashed, -latex] (1)--(AUS);
  \draw[dashed, -latex] (2)--(CHI);
  \draw[dashed, -latex] (3)--(CHINA);
  \draw[dashed, -latex] (4)--(Nevada);
  \draw[dashed, -latex] (5)--(Shanghai);
\end{tikzpicture}
```

Figure 17: `graph-17.tex`: Large node labels using variables




```
\begin{tikzpicture}
  \tikzset{
    >=stealth,
    parent node/.style={
      rectangle split,
      rectangle split parts=2,
      align=left,
      text width=3cm,
      draw,
      node distance=1cm and 1cm
    }
  }
  \node[
    parent node,
    rectangle split parts=1,
    fill=gray!20
  ] (A) {$P_0$ \\ $(2.5, 3.75)$ \\ $LB=-62.5$};
  \node[
    parent node,
    rectangle split parts=1,
    node distance=1.2 and 1,
    below left =of A,
    fill=gray!20
  ] (B) {$P_1$ \\ $(2,4)$ \\ $f^*=-58$};
  \node[
    parent node,
    rectangle split parts=1,
    node distance=1.2 and 1,
    below right =of A
  ] (C) {$P_2$ \\ $(3,2.5)$ \\ $LB=-59$};
  \node[
    parent node,
    rectangle split parts=1,
    node distance=1.2 and 1,
    below left =of C
  ] (D) {$P_{21}$ \\ $(3.2, 2)$ \\ $LB=-57.6$};
  \node[
    parent node,
    rectangle split parts=1,
    node distance=1.2 and 1,
    below right =of C
  ] (E) {$P_{22}$ \\ Infeasible};

  \draw[->](A)--(B) node[midway,above,sloped] {$x_1 \leq 2$};
  \draw[->](A)--(C) node[midway,above,sloped] {$x_1 \geq 3$};
  \draw[->](C)--(D) node[midway,above,sloped] {$x_2 \leq 2$};
  \draw[->](C)--(E) node[midway,above,sloped] {$x_2 \geq 3$};
\end{tikzpicture}
```

Figure 18: `graph-18.tex`: Branch & Bound tree

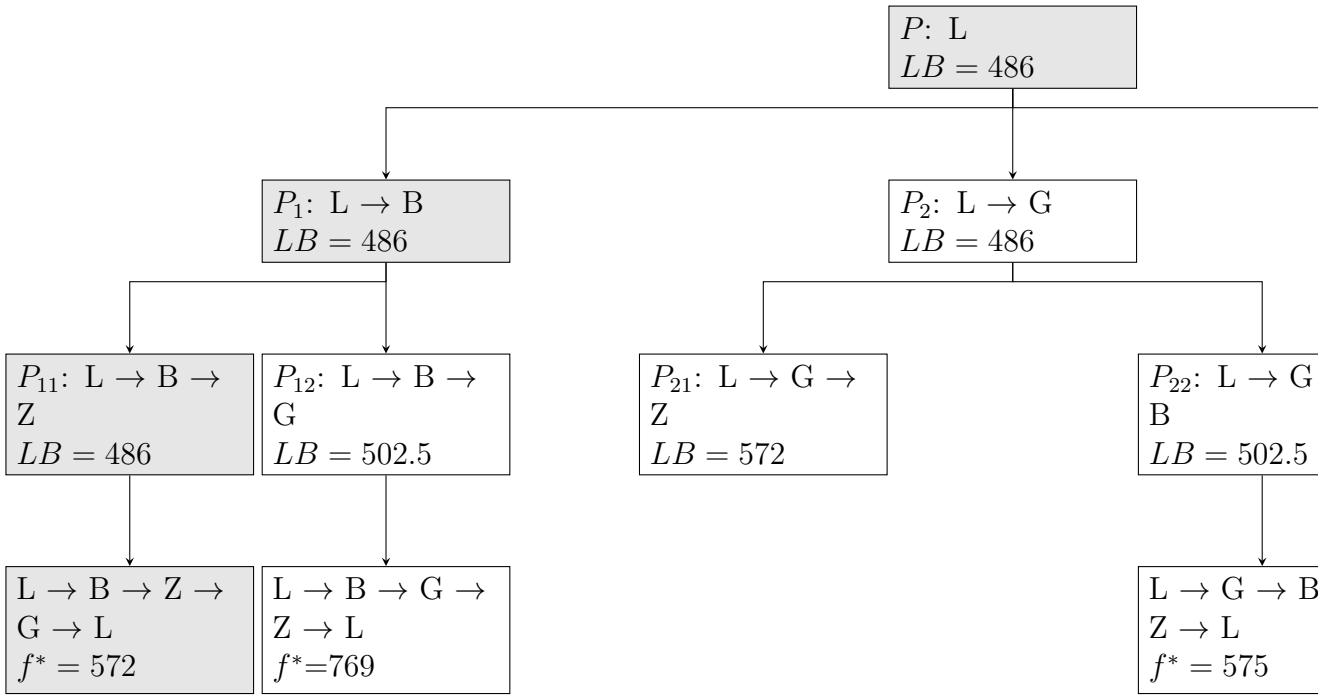
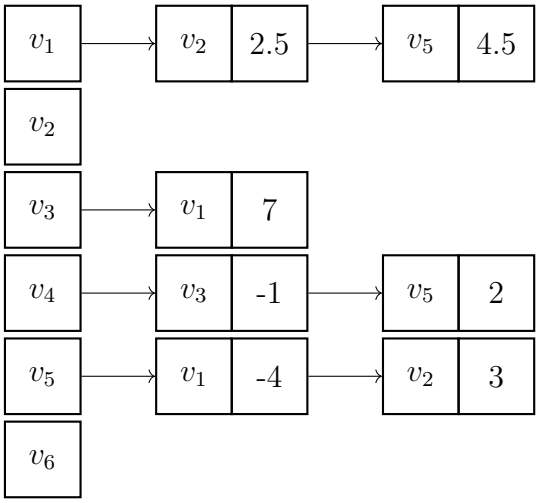
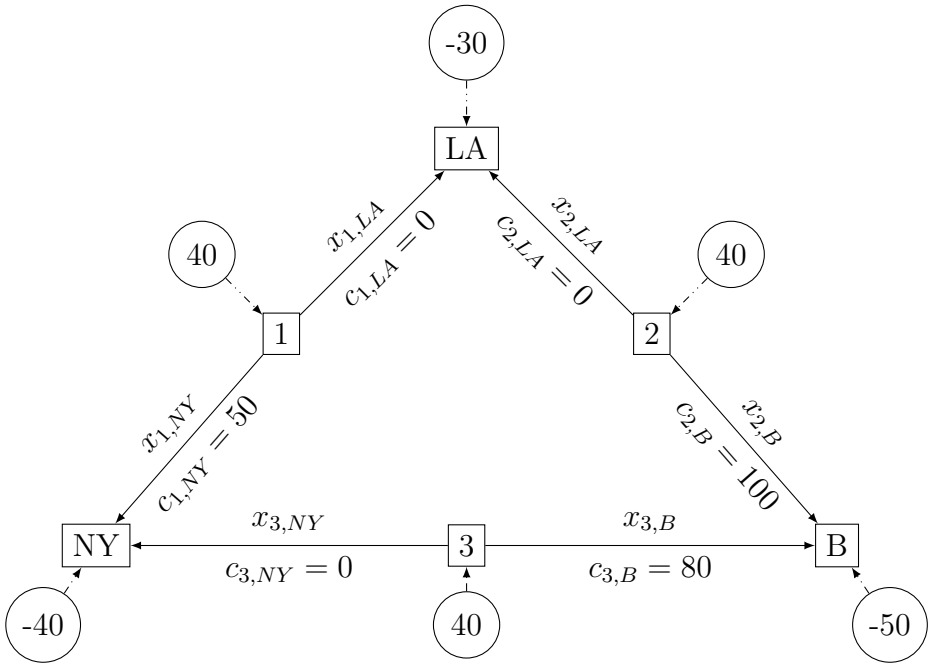


Figure 19: `graph-21.tex`: Branch & Bound tree



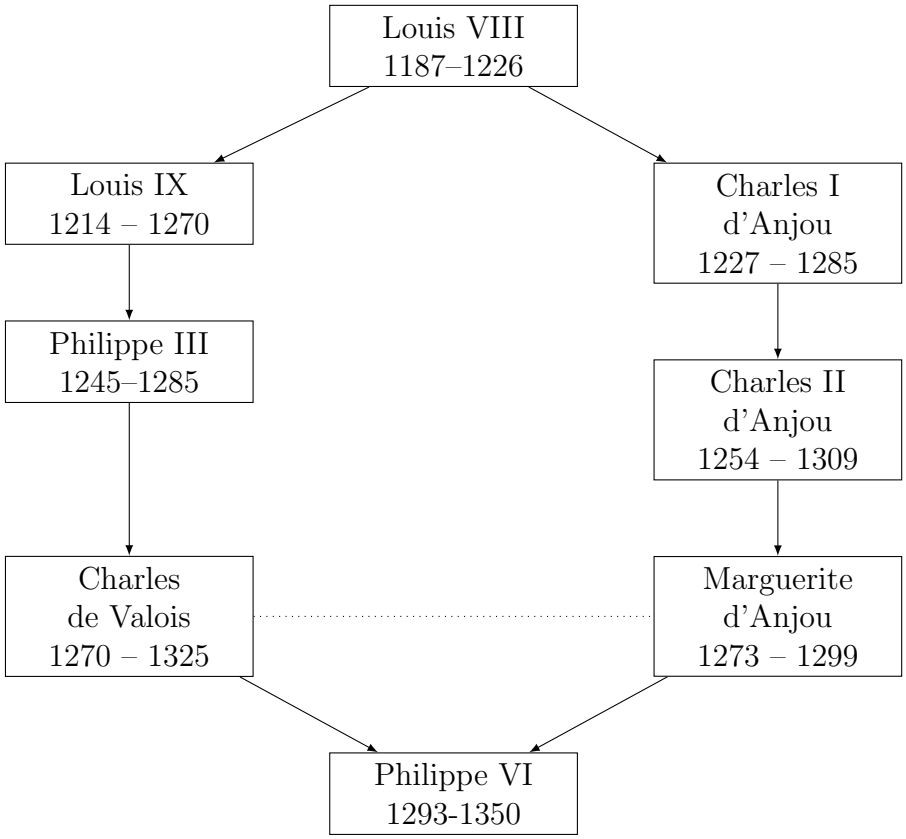

```
\begin{tikzpicture}
  \tikzset{every node/.style={
      draw,
      thick,
      minimum width=1cm,
      minimum height=1cm}}
  \node (rect1_1) at (0, 5.4) {$v_1$} ;
  \node (rect1_2) at (2, 5.4) {$v_2$} ;
  \node (rect1_3) at (3, 5.4) {$2.5$} ;
  \node (rect1_4) at (5, 5.4) {$v_5$} ;
  \node (rect1_5) at (6, 5.4)  {$4.5$} ;
  \draw[->] (rect1_1) to (rect1_2);
  \draw[->] (rect1_3) to (rect1_4);
  \node (rect2_1) at (0, 4.3) {$v_2$} ;
  \node (rect3_1) at (0, 3.2) {$v_3$} ;
  \node (rect3_2) at (2, 3.2) {$v_1$} ;
  \node (rect3_3) at (3, 3.2) {$7$} ;
  \draw[->] (rect3_1) to (rect3_2);
  \node (rect4_1) at (0, 2.1) {$v_4$} ;
  \node (rect4_2) at (2, 2.1) {$v_3$} ;
  \node (rect4_3) at (3, 2.1) {-1} ;
  \node (rect4_4) at (5, 2.1) {$v_5$} ;
  \node (rect4_5) at (6, 2.1) {2} ;
  \draw[->] (rect4_1) to (rect4_2);
  \draw[->] (rect4_3) to (rect4_4);
  \node (rect5_1) at (0, 1) {$v_5$} ;
  \node (rect5_2) at (2, 1) {$v_1$} ;
  \node (rect5_3) at (3, 1) {-4} ;
  \node (rect5_4) at (5, 1) {$v_2$} ;
  \node (rect5_5) at (6, 1) {3} ;
  \draw[->] (rect5_1) to (rect5_2);
  \draw[->] (rect5_3) to (rect5_4);
  \node (rect) at (0, -0.1) {$v_6$} ;
\end{tikzpicture}
```

Figure 20: `graph-19.tex`: List of pointers



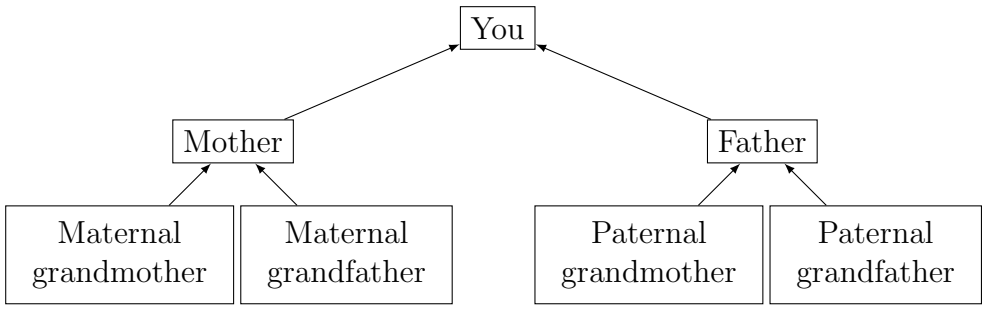

```
\begin{tikzpicture}[scale=0.7]
 \draw node[rectangle, draw] (LA) at (0,7) {LA};
 \draw node[rectangle, draw] (NY) at (-7,-0.5) {NY};
 \draw node[rectangle, draw] (B) at (7,-0.5) {B};
 \draw node[rectangle, draw] (1) at (-3.5,3.5) {1};
 \draw node[rectangle, draw] (2) at (3.5,3.5) {2};
 \draw node[rectangle, draw] (3) at (0,-0.5) {3};

 \draw[-latex] (2) -- (LA)
 node[midway, sloped, above] {$x_{2, LA}$}
 node[midway, sloped, below] {$c_{2, LA}=0$};

 \draw[-latex] (2) -- (B)
 node[midway, sloped, above] {$x_{2, B}$}
 node[midway, sloped, below] {$c_{2, B}=100$};

 \draw[-latex] (1) -- (LA)
 node[midway, sloped, above] {$x_{1, LA}$}
 node[midway, sloped, below] {$c_{1, LA}=0$};

 \draw[-latex] (1) -- (NY)
 node[midway, sloped, above] {$x_{1, NY}$}
 node[midway, sloped, below] {$c_{1, NY}=50$};

 \draw[-latex] (3) -- (B)
 node[midway, sloped, above] {$x_{3, B}$}
 node[midway, sloped, below] {$c_{3, B}=80$};

 \draw[-latex] (3) -- (NY)
 node[midway, sloped, above] {$x_{3, NY}$}
 node[midway, sloped, below] {$c_{3, NY}=0$};

 \draw node[circle, draw] (4) at (0, 9) {-30};
 \draw[-latex, dashdotdotted] (4)--(LA);
 \draw node[circle, draw] (5) at (-5, 5) {40};
 \draw[-latex, dashdotdotted] (5)--(1);
 \draw node[circle, draw] (6) at (5, 5) {40};
 \draw[-latex, dashdotdotted] (6)--(2);
 \draw node[circle, draw] (7) at (-8, -2) {-40};
 \draw[-latex, dashdotdotted] (7)--(NY);
 \draw node[circle, draw] (8) at (8, -2) {-50};
 \draw[-latex, dashdotdotted] (8)--(B);
 \draw node[circle, draw] (9) at (0, -2) {40};
 \draw[-latex, dashdotdotted] (9)--(3);
\end{tikzpicture}
```

Figure 21: `graph-20.tex`: Square and circle nodes and labels



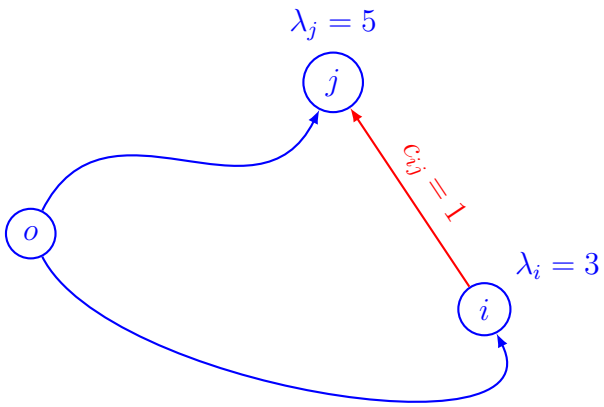

```
\tikzset{
  bnode/.style = {
    draw,
    text centered,
    text width=3cm}
}
\begin{tikzpicture}[scale=1.0, every node/.style={transform shape}]
  \node[bnode] (LOUISVIII) {
    Louis VIII \\  1187--1226
  };
  \node[bnode, below left=of LOUISVIII] (LOUIS_IX) {
    Louis IX \\ 1214 -- 1270
  };

  \node[bnode, below=of LOUIS_IX] (PHIL_III) {
    Philippe III \\ 1245--1285
  };

  \node[bnode, below right=of LOUISVIII] (CHI_ANJOU) {
    Charles I d'Anjou\\ 1227 -- 1285
  };

  \node[bnode, below=of CHI_ANJOU] (CHII_ANJOU) {
    Charles II d'Anjou\\ 1254 -- 1309
  };

  \node[bnode, below=of CHII_ANJOU] (MARG_ANJOU) {
    Marguerite d'Anjou\\ 1273 -- 1299
  };

  \node[bnode, below left=of MARG_ANJOU] (PH_VALOIS) {
    Philippe VI \\ 1293-1350
  };

  \path let \p1=(PHIL_III), \p2=(MARG_ANJOU) in node[bnode] (CH_VALOIS) at (\x1,\y2)   {
    Charles de Valois \\ 1270 -- 1325
  };

  \draw[-latex] (LOUISVIII) -- (LOUIS_IX) ;
  \draw[-latex] (LOUIS_IX) --  (PHIL_III) ;
  \draw[-latex] (PHIL_III) -- (CH_VALOIS) ;
  \draw[-latex] (CH_VALOIS)  -- (PH_VALOIS) ;
  \draw[-latex] (LOUISVIII) -- (CHI_ANJOU) ;
  \draw[-latex] (CHI_ANJOU) -- (CHII_ANJOU) ;
  \draw[-latex] (CHII_ANJOU) --(MARG_ANJOU) ;
  \draw[-latex] (MARG_ANJOU) --(PH_VALOIS) ;
  \draw[dotted] (CH_VALOIS) -- (MARG_ANJOU) ;
\end{tikzpicture}
```


Figure 22: `graph-22.tex`: Family tree with cycle



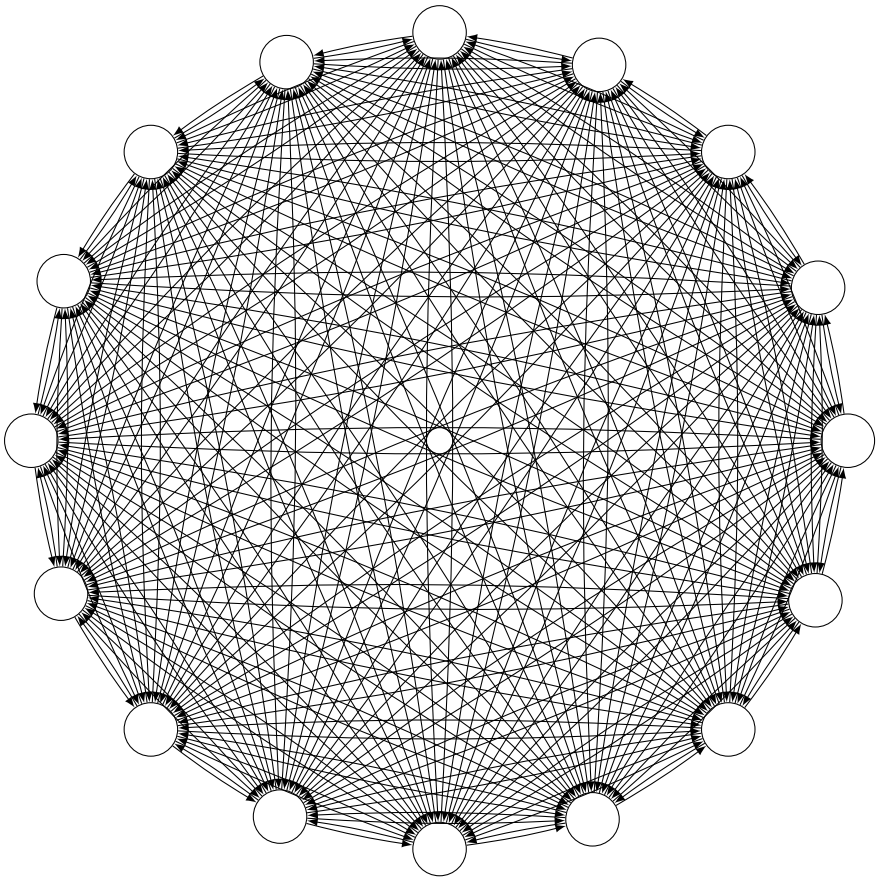

```
\begin{tikzpicture}
  \draw node[rectangle, draw] (0) at (0.5, 4) {You};
  \draw node[rectangle, draw] (1) at (-3, 2.5) {Mother};
  \draw node[rectangle, draw] (2) at (4, 2.5) {Father};
  \draw node[rectangle, draw] (3) at (-4.5, 1) {
    \begin{tabular}{c} Maternal \\ grandmother \end{tabular}
  };
  \draw node[rectangle, draw] (4) at (-1.5, 1) {
    \begin{tabular}{c} Maternal \\ grandfather \end{tabular}
  };
  \draw node[rectangle, draw] (5) at (2.5, 1) {
    \begin{tabular}{c} Paternal \\ grandmother \end{tabular}
  };
  \draw node[rectangle, draw] (6) at (5.5, 1) {
    \begin{tabular}{c} Paternal \\ grandfather \end{tabular}
  };

  \draw[latex-] (0) -- (1);
  \draw[latex-] (0) -- (2);
  \draw[latex-] (1) -- (3);
  \draw[latex-] (1) -- (4);
  \draw[latex-] (2) -- (5);
  \draw[latex-] (2) -- (6);

\end{tikzpicture}
```

Figure 23: `graph-23.tex`: Family tree



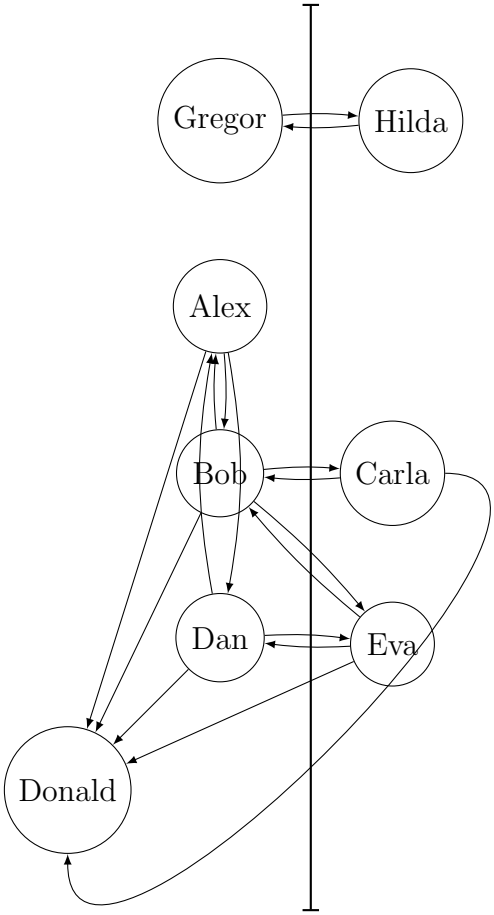

```
\begin{tikzpicture}[blue, thick]
  \node (No) at (0, 0) [circle, draw] {$o$} ;
  \node (Ni) at (6, -1) [circle, draw, label={above right}:{$\lambda_i=3$}] {$i$} ;
  \node (Nj) at (4, 2) [circle, draw, label={$\lambda_j=5$}] {$j$} ;

  \draw[-latex] (No) .. controls +(1, 2) and +(-1, -2) .. (Nj) ;
  \draw[-latex] (No) .. controls +(1, -2) and +(1, -2) .. (Ni) ;
  \draw[-latex, red] (Ni) -- (Nj) node[midway, sloped, above] {$c_{ij}=1$};
\end{tikzpicture}
```

Figure 24: `graph-24.tex`: Bezier curves



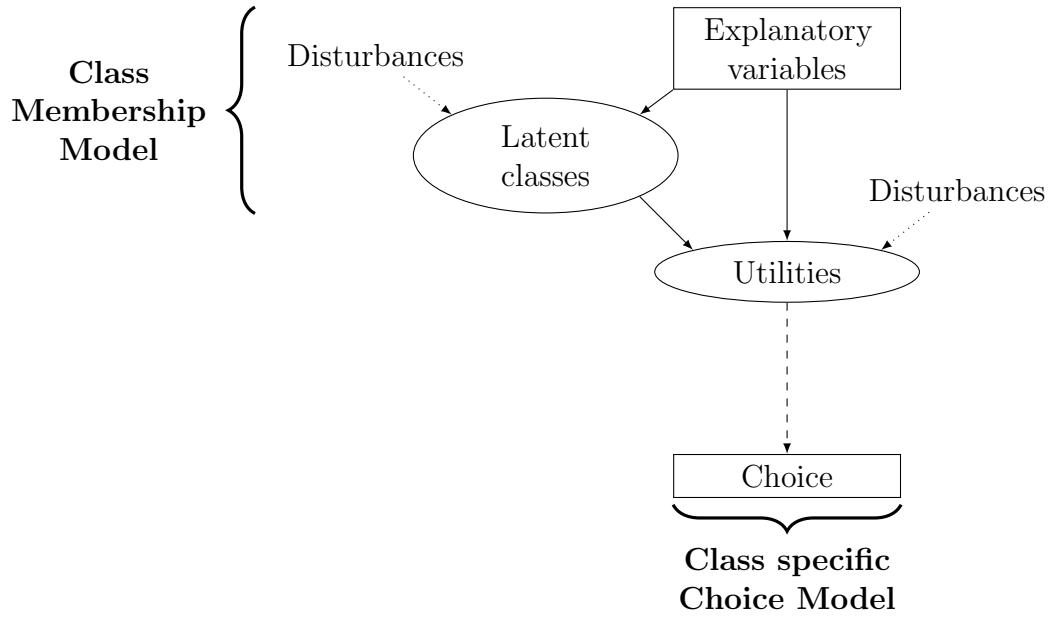
```
\newcount\mycount
\begin{tikzpicture}[transform shape]
  %the multiplication with floats is not possible. Thus I split the loop in two.
  \foreach \number in {1, ..., 8}{
    % Computer angle:
    \mycount=\number
    \advance\mycount by -1
    \multiply\mycount by 45
    \advance\mycount by 0
    \node[draw, circle, inner sep=0.25cm] (N-\number) at (\the\mycount:5.4cm) {};
  }
  \foreach \number in {9, ..., 16}{
    % Computer angle:
    \mycount=\number
    \advance\mycount by -1
    \multiply\mycount by 45
    \advance\mycount by 22.5
    \node[draw, circle, inner sep=0.25cm] (N-\number) at (\the\mycount:5.4cm) {};
  }
  \foreach \number in {1, ..., 15} {
    \mycount=\number
    \advance\mycount by 1
    \foreach \numbera in {\the\mycount, ..., 16} {
      \path (N-\number) {
        edge[-latex, bend right=3] (N-\numbera)
        edge[latex-, bend left=3] (N-\numbera)
      };
    }
  }
\end{tikzpicture}
```

Figure 25: `graph-25.tex`: Complex loops




```
\begin{tikzpicture}
  \draw[thick, |-|] (1.2, -8) -- (1.2, 4);
  \node [circle, draw] (a) {Alex};
  \node [circle, draw] (b) [below=of a] {Bob};
  \node [circle, draw] (d) [below=of b] {Dan};
  \node [circle, draw] (f) [below left=of d] {Donald};
  \node [circle, draw] (c) [right=of b] {Carla};
  \node [circle, draw] (e) [below=of c] {Eva};
  \node [circle, draw] (g) [above=of a] {Gregor};
  \node [circle, draw] (h) [right=of g] {Hilda};
  \draw [-latex] (g) to [bend left=5](h);
  \draw [latex-] (g) to [bend right=5] (h);
  \draw [-latex] (a) to (f);
  \draw [-latex] (b) to (f);
  \draw [-latex] (c) to [in=270, out=0] (f);
  \draw [-latex] (d) to (f);
  \draw [-latex] (e) to (f);
  \draw [-latex] (a) to [bend left=5] (b);
  \draw [-latex] (b) to [bend left=5](c);
  \draw [-latex] (d) to [bend left=5](e);
  \draw [-latex] (b) to [bend left=5] (e);
  \draw [-latex] (a) to [bend left=10] (d);
  \draw [latex-] (a) to [bend right=5](b);
  \draw [latex-] (b) to [bend right=5](c);
  \draw [latex-] (d) to [bend right=5](e);
  \draw [latex-] (b) to [bend right=5] (e);
  \draw [latex-] (a) to [bend right=10] (d);
\end{tikzpicture}
```


Figure 26: `graph-26.tex`: Graph with double links and separator




```
\begin{tikzpicture}[scale=0.6]
  \tikzstyle{every node}=[
    minimum width=3cm,
    align=center,
  ]
  \tikzstyle{ellipse node}=[
    draw, ellipse, text width=2.2cm, align=center
  ]
  \tikzstyle{rect node}=[
    draw, rectangle, text width=2.2cm, align=center
  ]
  \node (U) [ellipse node] {Utilities} ;
  \node (LC) [ellipse node, above left = 1cm of U] {Latent classes};
  \node (EV) [rect node, above = 2cm of U] {Explanatory variables} ;
  \node (C) [rect node, below = 2cm of U] {Choice} ;
  \node (DLC) [above left = 0.5cm and -0.5cm of LC] {Disturbances} ;
  \node (DU) [above right = 0.5cm and -0.5cm of U] {Disturbances} ;
  \draw[-latex, dotted] (DLC) -- (LC.north west) ;
  \draw[-latex, dotted] (DU) -- (U.north east) ;
  \draw[-latex] (EV.south west) -- (LC.north east) ;
  \draw[-latex] (EV.south) -- (U.north) ;
  \draw[-latex] (LC.south east) -- (U.north west) ;
  \draw[-latex, dashed] (U.south) -- (C.north) ;
  \draw [
    very thick,
    decorate,
    decoration={brace, amplitude=10pt, raise=2.5pt},
  ] (C.south east) -- (C.south west)
    node [midway, below=0.5cm] {\bf Class specific \\ \bf Choice Model};
  \draw [
    very thick,
    decorate,
    decoration={brace, amplitude=10pt, raise=2.5pt},
  ] (LC.south -| DLC.west)-- (EV.north -| DLC.west)
    node [midway, left=0.5cm] {\bf Class \\ \bf Membership \\ \bf Model};
\end{tikzpicture}
```

Figure 27: `graph-27.tex`: Diagram with curly braces and node styles