

DCpic - Examples - 2013/05/01 (v15)

1 Commutative Diagrams

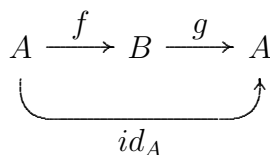
1.1 Curved Arrows

A rectangular curve with rounded corners is easy to specify and should cater for most needs. With this in mind we give the following tip to the user: to specify a rectangular, with rounded corners, curve we choose the points which give us the *expanded chess-horse movement*, that is, (x, y) , $(x \pm 4, y \mp 1)$, $(x \mp 1, y \pm 4)$, or (x, y) , $(x \pm 1, y \mp 4)$, $(x \mp 4, y \pm 1)$, those sets of points will give us the four corners of the rectangle; to form the whole line it is only necessary to add an odd number of points joining the two (or more) corners.

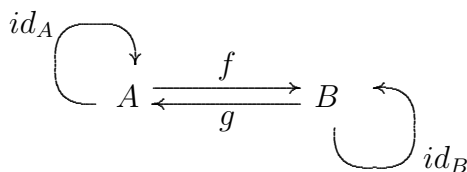
```
\begin{dc}{\commdiag}
\cmor((10,20)(6,21)(5,25)) \pup(5,15){\$x\$}
\end{dc}
```



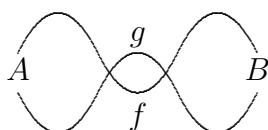
```
\begin{dc}{\commdiag}
\obj(10,15){\$A\$}
\obj(40,15)[A1]{\$A\$}
\obj(25,15){\$B\$}
\mor{\$A\$}{\$B\$}{\$f\$} \mor{\$B\$}{A1}{\$g\$}
\cmor((10,11)(11,7)(15,6)(25,6)(35,6)(39,7)(40,11)) \pup(25,3){\$id_{A\$}}
\end{dc}
```



```
\begin{dc}{\commdiag}
\obj(14,11){\$A\$}
\obj(39,11){\$B\$}
\mor(14,12)(39,12){\$f\$} \mor(39,10)(14,10){\$g\$}
\cmor((10,10)(6,11)(5,15)(6,19)(10,20)(14,19)(15,15)) \pdown(2,20){\$id_{A\$}}
\cmor((40,7)(41,3)(45,2)(49,3)(50,7)(49,11)(45,12)) \pleft(54,3){\$id_{B\$}}
\end{dc}
```



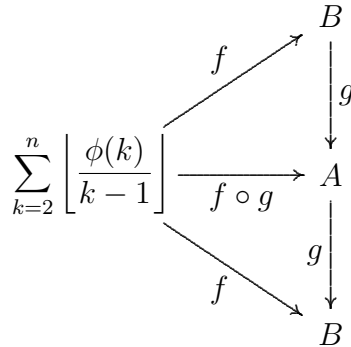
```
\begin{dc}{\commdiag}
\obj(10,18){\$A\$}
\obj(40,18){\$B\$}
\cmor((10,20)(15,25)(20,20)(25,15)(30,20)(35,25)(40,20))
\pdown(25,12){\$f\$}[2]
\cmor((10,15)(15,10)(20,15)(25,20)(30,15)(35,10)(40,15))
\pup(25,22){\$g\$}[2]
\end{dc}
```



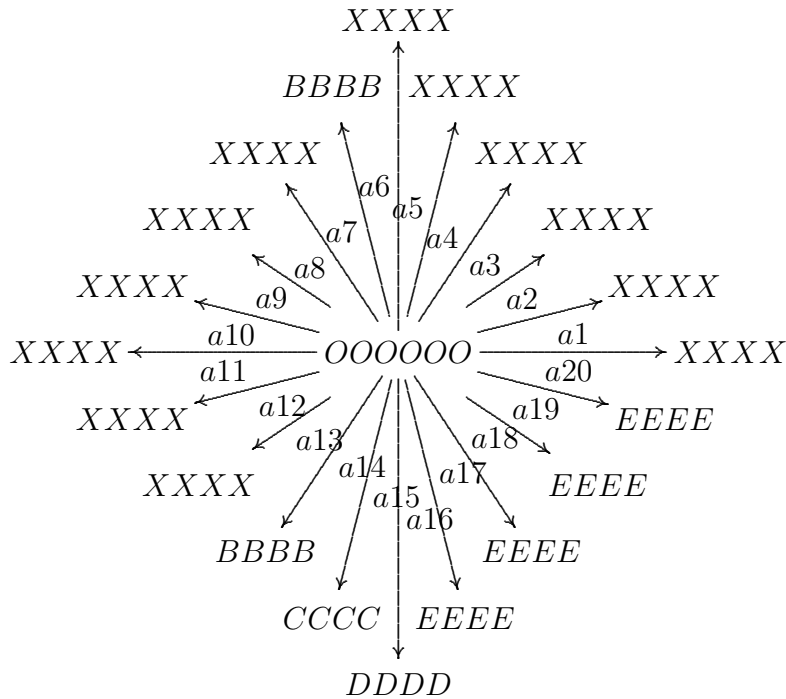
1.2 Size Adjusting

In version 4 (v4.0) two new features are introduced, relative specification $\text{\mor\{objA\}\{objB\}}$ instead of \mor(1,3)(4,5) , and the arrows now automatically adjust their size to the object's box size.

```
\begin{c}
\commdiag[300]
\obj(1,3)[objSum]{\displaystyle\sum_{k=2}^n\left\lfloor\frac{\phi(k)}{k-1}\right\rfloor}
\obj(4,5)[objB]{\mathbb{B}}
\obj(4,3)[objA]{\mathbb{A}}
\obj(4,1)[objBp]{\mathbb{B}}
\mor{objSum}{objB}{\mathbb{B}}
\mor{objB}{objA}{\mathbb{A}}
\mor{objSum}{objA}{\mathbb{A}}{\circ g}{\atright,\solidarrow}
\mor{objSum}{objBp}{\mathbb{B}}{\atright,\solidarrow}
\mor{objA}{objBp}{\mathbb{B}}{\atright,\solidarrow}
\end{c}
```



```
\begin{c}
\commdiag[250]
\obj(10,10)[A]{\mathbb{A}}\obj(15,10)[Aa]{\mathbb{A}}\obj(14,11)[Ab]{\mathbb{A}}
\obj(13,12)[Ac]{\mathbb{A}}\obj(12,13)[Ad]{\mathbb{A}}\obj(11,14)[Ae]{\mathbb{A}}
\obj(10,15)[Af]{\mathbb{A}}\obj(9,14)[Ag]{\mathbb{B}}\obj(8,13)[Ah]{\mathbb{A}}
\obj(7,12)[Ai]{\mathbb{A}}\obj(6,11)[Aj]{\mathbb{A}}\obj(5,10)[Ak]{\mathbb{A}}
\obj(6,9)[Al]{\mathbb{A}}\obj(7,8)[Am]{\mathbb{A}}\obj(8,7)[An]{\mathbb{B}}
\obj(9,6)[Ao]{\mathbb{C}}\obj(10,5)[Ap]{\mathbb{D}}\obj(11,6)[Aq]{\mathbb{E}}
\obj(12,7)[Ar]{\mathbb{E}}\obj(13,8)[As]{\mathbb{E}}\obj(14,9)[At]{\mathbb{E}}
\mor{A}{Aa}{\mathbb{A}}\mor{A}{Ab}{\mathbb{A}}\mor{A}{Ac}{\mathbb{A}}\mor{A}{Ad}{\mathbb{A}}
\mor{A}{Ae}{\mathbb{A}}\mor{A}{Af}{\mathbb{A}}\mor{A}{Ag}{\mathbb{B}}\mor{A}{Ah}{\mathbb{A}}
\mor{A}{Ai}{\mathbb{A}}\mor{A}{Aj}{\mathbb{A}}\mor{A}{Ak}{\mathbb{A}}\mor{A}{Al}{\mathbb{A}}
\mor{A}{Am}{\mathbb{A}}\mor{A}{An}{\mathbb{B}}\mor{A}{Ao}{\mathbb{C}}\mor{A}{Ap}{\mathbb{D}}
\mor{A}{Aq}{\mathbb{E}}\mor{A}{Ar}{\mathbb{E}}\mor{A}{As}{\mathbb{E}}\mor{A}{At}{\mathbb{E}}
\end{c}
```

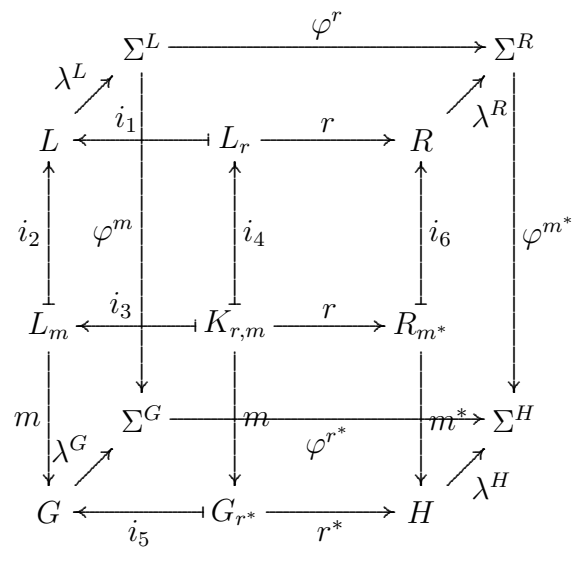


1.3 A Complex Diagram

```

\begin{c}
\commdiag [350]
\obj (1,1) [Gr] {G}
\obj (3,1) [Grstar] {G_{r^*}}
\obj (5,1) [H] {H}
\obj (2,2) [SigmaG] {\Sigma^G}
\obj (6,2) [SigmaH] {\Sigma^H}
\obj (1,3) [Lm] {L_m}
\obj (3,3) [Krm] {K_{r,m}}
\obj (5,3) [Rmstar] {R_{m^*}}
\obj (1,5) [L] {L}
\obj (3,5) [Lr] {L_r}
\obj (5,5) [R] {R}
\obj (2,6) [SigmaL] {\Sigma^L}
\obj (6,6) [SigmaR] {\Sigma^R}
\mor {Gr} {SigmaG} {\lambda^G}
\mor {Grstar} {Gr} {i_5} [\leftarrow]
\mor {Grstar} {H} {r^*} [\rightarrow]
\mor {H} {SigmaH} {\lambda^H}
\mor {SigmaG} {SigmaH} {\varphi^m}
\mor {Lm} {Gr} {m} [\rightarrow]
\mor {Lm} {L} {i_2} [\leftarrow]
\mor {Krm} {Lm} {i_3} [\rightarrow]
\mor {Krm} {Rmstar} {r} [\rightarrow]
\mor {Krm} {Lr} {i_4} [\leftarrow]
\mor {Krm} {Grstar} {m} [\rightarrow]
\mor {Rmstar} {R} {i_6} [\leftarrow]
\mor {Rmstar} {H} {m^*} [\rightarrow]
\mor {L} {SigmaL} {\lambda^L}
\mor {Lr} {L} {i_1} [\leftarrow]
\mor {Lr} {R} {i_6} [\leftarrow]
\mor {R} {SigmaR} {\lambda^R}
\mor {SigmaL} {SigmaG} {\varphi^r}
\mor {SigmaL} {SigmaR} {\lambda^R}
\mor {SigmaL} {SigmaG} {\varphi^{r^*}}
\mor {SigmaL} {SigmaR} {\varphi^m}
\mor {SigmaR} {SigmaH} {\varphi^{m^*}}
\end{c}

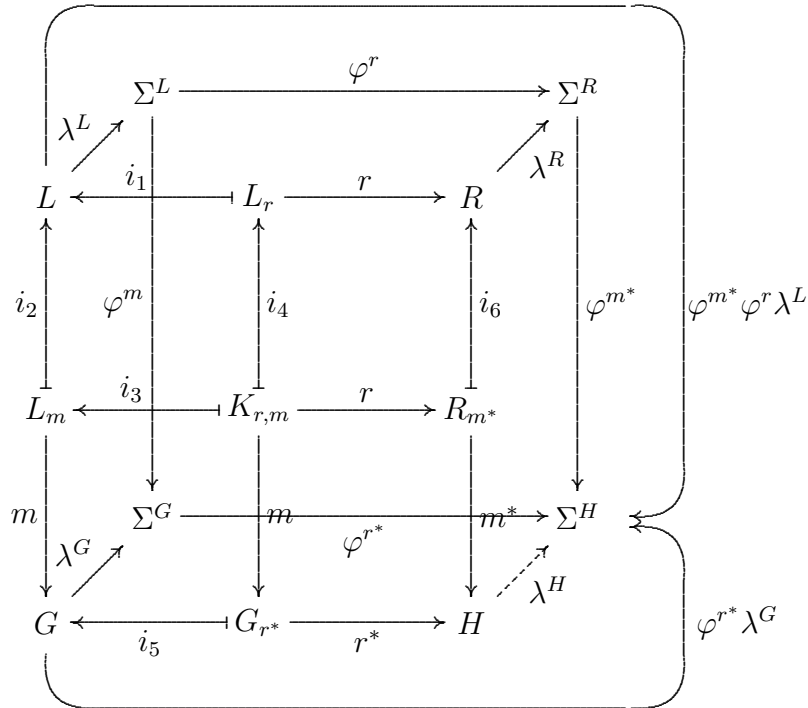
```



```

\begin{cd}[commdiag]{40}
\obj(10,10){G\Sigma}[Gr]
\obj(30,10){G_{r^*}}[Grstar]
\obj(50,10){H\Sigma}[H]
\obj(20,20){\Sigma^G\Sigma}[SigmaG]
\obj(60,20){\Sigma^H\Sigma}[SigmaH]
\obj(10,30){L_m\Sigma}[Lm]
\obj(30,30){K_{r,m}}[Krm]
\obj(50,30){R_{m^*}}[Rmstar]
\obj(10,50){L\Sigma}[L]
\obj(30,50){L_r\Sigma}[Lr]
\obj(50,50){R\Sigma}[R]
\obj(20,60){\Sigma^L\Sigma}[SigmaL]
\obj(60,60){\Sigma^R\Sigma}[SigmaR]
\mor{Gr}{SigmaG}{\lambda^G\Sigma}
\mor{Grstar}{Gr}{i_{-5}}[\atleftarrow,\applicationarrow]
\mor{Grstar}{H}{r^*}[\atrightrightarrow,\solidarrow]
\mor{H}{SigmaH}{\lambda^H\Sigma}[\atrightrightarrow,\dashrightarrow]
\mor{SigmaG}{SigmaH}{\varphi^r}[\atrightrightarrow,\solidarrow]
\mor{Lm}{Gr}{m}[\atrightrightarrow,\solidarrow]
\mor{Lm}{L}{i_{-2}}[\atleftarrow,\applicationarrow]
\mor{Krm}{Lm}{i_{-3}\quad}[\atrightrightarrow,\applicationarrow]
\mor{Krm}{Rmstar}{r}
\mor{Krm}{Lr}{i_{-4}}[\atrightrightarrow,\applicationarrow]
\mor{Krm}{Grstar}{m}
\mor{Rmstar}{R}{i_{-6}}[\atrightrightarrow,\applicationarrow]
\mor{Rmstar}{H}{m^*}
\mor{L}{SigmaL}{\lambda^L\Sigma}
\mor{Lr}{L}{i_{-1}\quad}[\atrightrightarrow,\applicationarrow]
\mor{Lr}{R}{r}
\mor{R}{SigmaR}{\lambda^R\Sigma}[\atrightrightarrow,\solidarrow]
\mor{SigmaL}{SigmaG}{\varphi^{m^*}}[\atrightrightarrow,\solidarrow]
\mor{SigmaL}{SigmaR}{\varphi^r}[\atrightrightarrow,\solidarrow]
\mor{SigmaR}{SigmaH}{\varphi^{m^*}}[\atrightrightarrow,\solidarrow]
\cmor((10,7)(11,3)(15,2)(40,2)(65,2)(69,3)(70,7)(70,10)(70,14)(69,18)(65,19))
\pleft(75,10){\varphi^r\lambda^G\Sigma}
\cmor((10,53)(10,58)(10,63)(11,67)(15,68)(45,68)(65,68)(69,67)(70,63)(70,44)(70,25)(69,21)(65,20))
\pleft(76,40){\varphi^r\lambda^G\Sigma}
\end{cd}

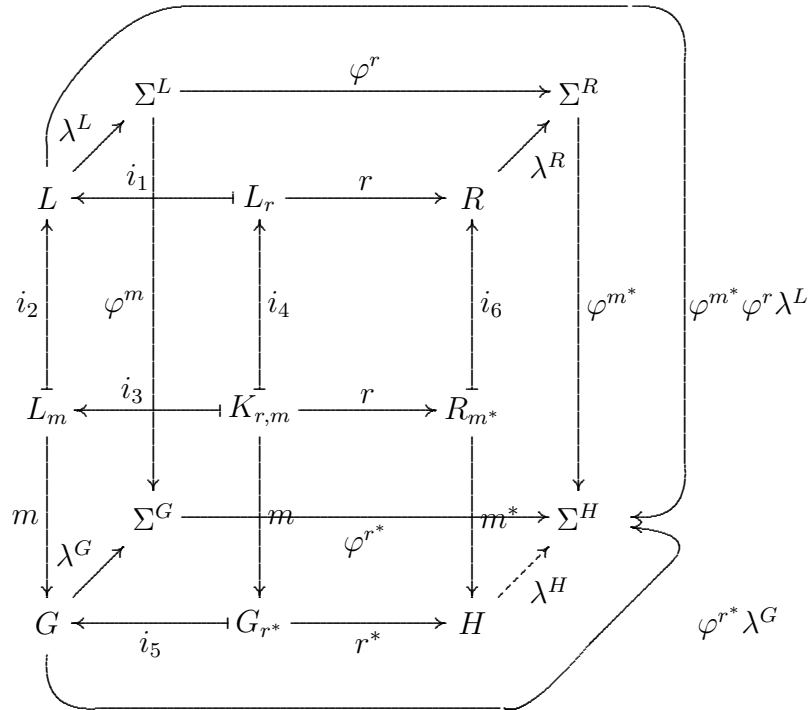
```



```

\begin{cd}{\commdiag}[40]
\obj(10,10)[Gr]{G$}
\obj(30,10)[Grstar]{G_{r^*}$}
\obj(50,10)[H]{H$}
\obj(20,20)[SigmaG]{Sigma^G$}
\obj(60,20)[SigmaH]{Sigma^H$}
\obj(10,30)[Lm]{L_m$}
\obj(30,30)[Krm]{K_{r,m}$}
\obj(50,30)[Rmstar]{R_{m^*}$}
\obj(10,50)[L]{L$}
\obj(30,50)[Lr]{L_r$}
\obj(50,50)[R]{R$}
\obj(20,60)[SigmaL]{Sigma^L$}
\obj(60,60)[SigmaR]{Sigma^R$}
\mor{Gr}{SigmaG}{\lambda^G$}
\mor{Grstar}{Gr}{i_5$}[\atleft,\applicationarrow]
\mor{Grstar}{H}{i_5^*$}[\atright,\solidarrow]
\mor{H}{SigmaH}{\lambda^H$}[\atright,\dashArrow]
\mor{SigmaG}{SigmaH}{\varphi^r$}[\atright,\solidarrow]
\mor{Lm}{Gr}{i_2$}[\atright,\solidarrow]
\mor{Lm}{L}{i_2^*$}[\atleft,\applicationarrow]
\mor{Krm}{Lm}{i_3$}[\atright,\applicationarrow]
\mor{Krm}{Rmstar}{i_3^*$}[\atright,\applicationarrow]
\mor{Krm}{Lr}{i_4$}[\atright,\applicationarrow]
\mor{Krm}{Grstar}{i_4^*$}[\atright,\applicationarrow]
\mor{Rmstar}{R}{i_6$}[\atright,\applicationarrow]
\mor{Rmstar}{H}{i_6^*$}[\atright,\applicationarrow]
\mor{L}{SigmaL}{\lambda^L$}
\mor{Lr}{L}{i_1$}[\atright,\applicationarrow]
\mor{Lr}{R}{i_1^*$}[\atright,\applicationarrow]
\mor{R}{SigmaR}{\lambda^R$}[\atright,\solidarrow]
\mor{SigmaL}{SigmaG}{\varphi^m$}[\atright,\solidarrow]
\mor{SigmaL}{SigmaR}{\varphi^{r^*}$}[\atright,\solidarrow]
\mor{SigmaR}{SigmaH}{\varphi^{r^*}$}[\atright,\solidarrow]
\mor{SigmaR}{SigmaG}{\varphi^m$}[\atright,\solidarrow]
\cmor((10,7)(11,3)(15,2)(33,2)(53,2)(56,3)(61,8)(66,13)(69,16)(69,18)(65,19))
\pleft(75,10){\varphi^r$}[\lambda^G$]
\cmor((10,53)(10,54)(10,55)(11,59)(15,64)(19,67)(23,68)(44,68)(65,68)(69,67)%
(70,63)(70,44)(70,25)(69,21)(65,20))
\pleft(76,40){\varphi^{r^*}$}[\lambda^H$]
\end{cd}

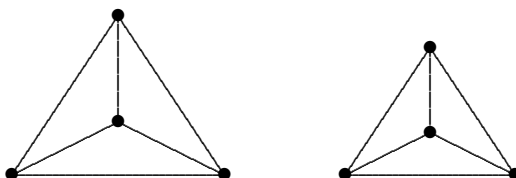
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2 Graphs

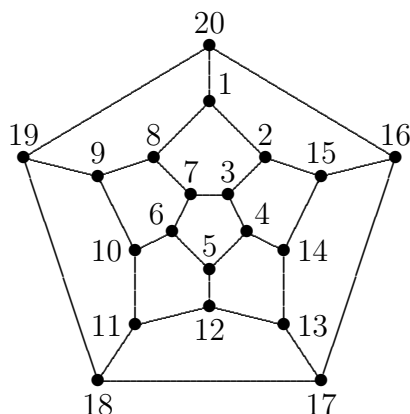
2.1 Undirected Graphs — Magnification Factor,

The magnification factor gives us the capability of adapting the size of the graph to the available space, without having to redesign the graph, for example the specification of the next two graphs differs only in the magnification factor: 200 for the first; and 160 for the second.



<pre> \begin{dc}\undigraph}[200] \obj(1,1)[1]{} \obj(3,2)[2]{} \obj(5,1)[3]{} \obj(3,4)[4]{} \mor{1}{2}{} \mor{1}{3}{} \mor{2}{3}{} \mor{4}{1}{} \mor{4}{3}{} \mor{2}{4}{} \end{dc} </pre>	<pre> \begin{dc}\undigraph}[160] \obj(1,1)[1]{} \obj(3,2)[2]{} \obj(5,1)[3]{} \obj(3,4)[4]{} \mor{1}{2}{} \mor{1}{3}{} \mor{2}{3}{} \mor{4}{1}{} \mor{4}{3}{} \mor{2}{4}{} \end{dc} </pre>
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2.2 Undirected Graphs — “Around the World”

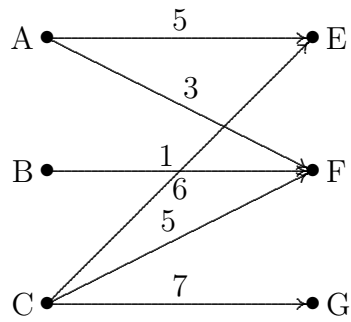


```

\begin{dc}\undigraph}[70]
\obj(6,4){18}[\south]
\obj(18,4){17}[\south]
\obj(8,7){11}[\west]
\obj(12,8){12}[\south]
\obj(16,7){13}[\east]
\obj(8,11){10}[\west]
\obj(10,12){6}[\northwest]
\obj(12,10){5}
\obj(14,12){4}[\northeast]
\obj(16,11){14}[\east]
\obj(2,16){19} \obj(6,15){9} \obj(9,16){8} \obj(11,14){7}
\obj(13,14){3} \obj(15,16){2} \obj(18,15){15} \obj(22,16){16}
\obj(12,19){1}[\northeast]
\obj(12,22){20}
\mor{18}{17}{} \mor{18}{11}{} \mor{18}{19}{} \mor{11}{12}{} \mor{11}{10}{} \mor{12}{13}{}
\mor{12}{5}{} \mor{10}{6}{} \mor{10}{9}{} \mor{5}{6}{} \mor{5}{4}{} \mor{13}{17}{}
\mor{13}{14}{} \mor{9}{19}{} \mor{9}{8}{} \mor{6}{7}{} \mor{4}{3}{} \mor{4}{14}{}
\mor{19}{20}{} \mor{8}{1}{} \mor{8}{7}{} \mor{7}{3}{} \mor{3}{2}{} \mor{2}{1}{}
\mor{2}{15}{} \mor{14}{15}{} \mor{17}{16}{} \mor{16}{20}{} \mor{1}{20}{} \mor{15}{16}{}
\end{dc}

```

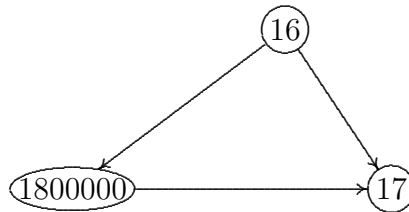
2.3 Directed Graphs



```

\begin{dc}\digraph [250]
\obj(1,5){A}\west
\obj(1,3){B}\west
\obj(1,1){C}\west
\obj(5,5){E}\east
\obj(5,3){F}\east
\obj(5,1){G}\east
\mor{A}{E}{5} \mor{A}{F}{3}
\mor{B}{F}{6}\atrightright, \solidarrow]
\mor{C}{E}{1} \mor{C}{F}{5} \mor{C}{G}{7}
\end{dc}
  
```

2.4 Circled Directed Graphs

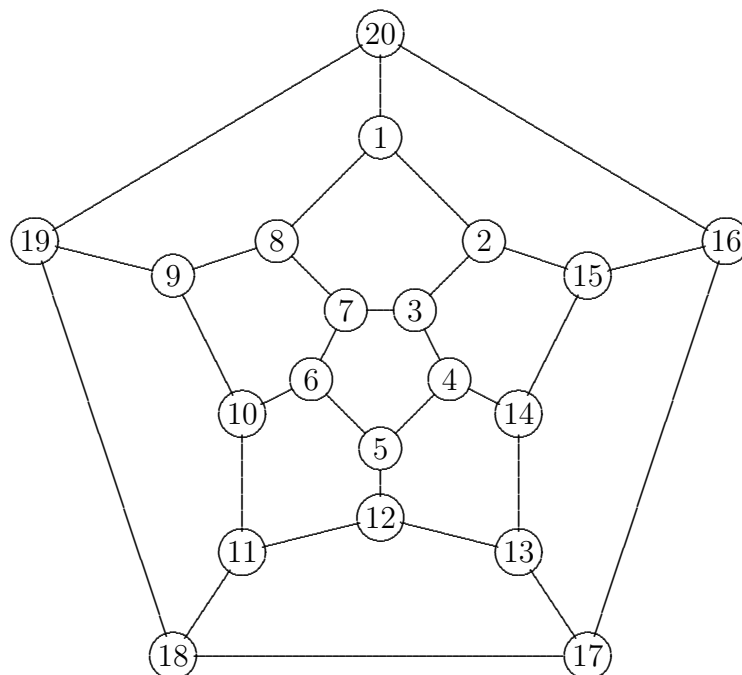


```

\begin{dc}\cdigraph [200]
\obj(6,6)[A]{1800000}
\obj(12,6){17}
\obj(10,9){16}
\mor{A}{17}[240,90]{}
\mor{16}{17}[90,90]{}
\mor{16}{A}[95,125]{}
\end{dc}
  
```

2.5 Circled Undirected Graphs

Some fine adjustment is needed in some lines.



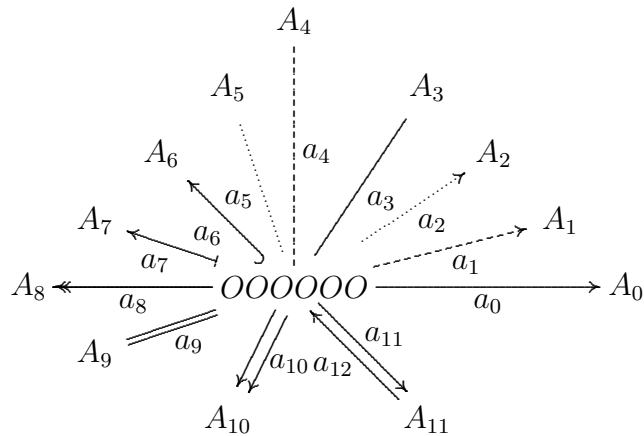
```

\begin{cundigraph}[130]
\obj(6,4)[A]{18}{\south}\obj(18,4){17}{\south}
\obj(8,7){11}{\west}\obj(12,8){12}{\south}
\obj(16,7){13}{\east}\obj(8,11){10}{\west}
\obj(10,12){6}{6}{\south}\obj(12,10){5}{5}{\east}
\obj(14,12){4}{\northeast}\obj(16,11){14}{\east}
\obj(2,16){19}{\west}\obj(6,15){9}
\obj(9,16){8}\obj(11,14){7}{\west}
\obj(13,14){3}\obj(15,16){2}
\obj(18,15){15}\obj(22,16){16}{\east}
\obj(12,19){1}{\west}\obj(12,22){20}{\north}
\mor{A}{17}{80,80}{\mor{A}{11}{\mor{A}{19}{\mor{11}{12}{\mor{11}{10}{\mor{12}{13}{\mor{12}{5}{\mor{10}{6}{\mor{10}{9}{\mor{5}{6}{\mor{5}{4}{\mor{13}{17}{80,80}{\mor{13}{14}{\mor{9}{19}{\mor{9}{8}{\mor{6}{7}{\mor{4}{3}{\mor{4}{14}{\mor{19}{20}{\mor{8}{1}{\mor{8}{7}{\mor{7}{3}{\mor{3}{2}{\mor{2}{1}{\mor{2}{15}{\mor{14}{15}{\mor{17}{16}{\mor{16}{20}{\mor{1}{20}{\mor{15}{16}{\enddc

```

3 New Arrows and Lines in v4 and v5

3.1 Dashed, Dotted Lines, Dotted Arrows, Equaline, ...



```

\begin{commdiag}[250]
\obj(10,10)[A]{\$OOOOO\$}
\obj(15,10)[A0]{\$A_0\$}
\obj(14,11)[A1]{\$A_1\$}
\obj(13,12)[A2]{\$A_2\$}
\obj(12,13)[A3]{\$A_3\$}
\obj(10,14)[A4]{\$A_4\$}
\obj(9,13)[A5]{\$A_5\$}
\obj(8,12)[A6]{\$A_6\$}
\obj(7,11)[A7]{\$A_7\$}
\obj(6,10)[A8]{\$A_8\$}
\obj(7,9)[A9]{\$A_9\$}
\obj(9,8)[A10]{\$A_{10}\$}
\obj(12,8)[A11]{\$A_{11}\$}
\mor{A}{A0}{\$a_0\$}{\atright,\solidarrow}
\mor{A}{A1}{\$a_1\$}{\atright,\dashArrow}
\mor{A}{A2}{\$a_2\$}{\atright,\dotArrow}
\mor{A}{A3}{\$a_3\$}{\atright,\solidline}
\mor{A}{A4}{\$a_4\$}{\atright,\dashline}
\mor{A}{A5}{\$a_5\$}{\atleft,\dotline}
\mor{A}{A6}{\$a_6\$}{\atleft,\injectionarrow}
\mor{A}{A7}{\$a_7\$}{\atleft,\aplicationarrow}
\mor{A}{A8}{\$a_8\$}{\atleft,\surjectivearrow}
\mor{A}{A9}{\$a_9\$}{\atleft,\equalline}
\mor{A}{A10}{\$a_{10}\$}{\atleft,\doublearrow}
\mor{A}{A11}{\$a_{11}\$}{\atleft,\doubleopposite}
\mor{A}{A11}{\$a_{12}\$}{\atright,\nullarrow}
\enddc

```