The usage of “dualgraph” by examples

November 12, 2005

1. Download Risa/Asir from `http://www.math.kobe-u.ac.jp/Asir/`

2. Install Risa/Asir according to manual.

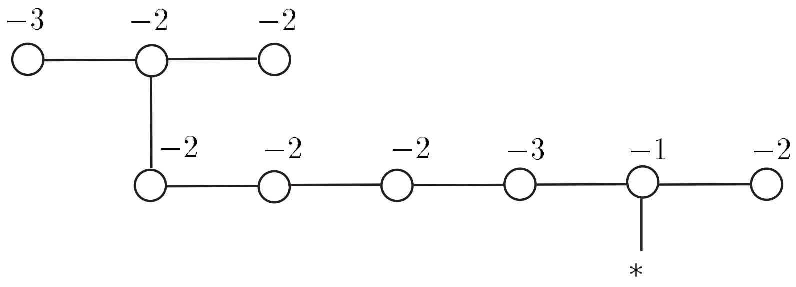
3. Carry out Asir.

   The package is the file `dualgraph.rr` in the directory 'asir-contrib/fj_curve'.
   Attention: The file “`dualgraph.rr`” contains Japanese jis code.

```
This is Risa/Asir, Version 20051106 (Kobe Distribution).
Copyright (C) 1994-2000, all rights reserved, FUJITSU LABORATORIES LIMITED.
Copyright 2000-2005, Risa/Asir committers, http://www.openxm.org/.
GC 6.5 Copyright 1988-2005, H-J. Boehm, A. J. Demers, Xerox, SGI, HP.
PARI 2.0.17, copyright 1989-1999, C. Batut, K. Belabas, D. Bernardi,
   H. Cohen and M. Olivier.
Debug windows of ox servers will not be opened. Set Xm_noX=0 to open it.
OpenXM/Risa/Asir-Contrib(20040302), Copyright 2000-2004, OpenXM.org committers
ox_help(0); ox_help("keyword"); ox_grep("keyword");
     for help messages (unix version only).
http://www.math.kobe-u.ac.jp/OpenXM/Current/doc/index-doc.html
[1217] load("gr")$
[1323] load("sp")$
[1425] load("fj_curve/dualgraph.rr")$
[1479] dual_graph((y^2-x^3)^2-y^7)$
*** Newton Polygon ***
[[0,4],[6,0]]
[[0,2],[9,0]]
***** Dual Graph *****
[3,[2,b1],2]
```

```
b1:[2,2,2,3,[1,b2],2]
b2:*
[1480]
```

This result means following dual graph.

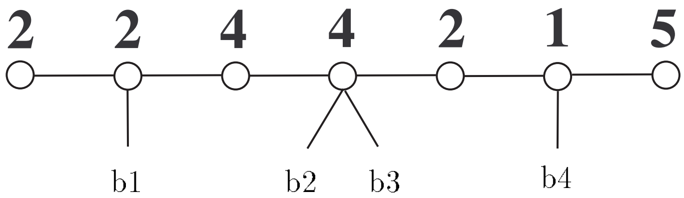



```
[194] F=((x^2-y^5)^2-x^5)*((-x^2+y^3)^2-y^9)
*((x^2+y^3)^2-x^7)*(x^4+y^5)$
[195] dual_graph(F)$
*** Newton Polygon ***
[[0,27],[4,17],[12,5],[16,0]]
[[0,2],[5,0]]
[[0,2],[6,0]]
[[0,2],[9,0]]
***** Dual graph *****
[2,[2,b1],4,[4,b2,b3],2,[1,b4],5]
b1:[2,3,[1,b5],2]
b5:*
b2:[2,2,[1,b6,b7]]
b6:*
b7:*
b3:[2,2,2,3,[1,b8],2]
b8:*
b4:*
```

"b1,b2,b3,b4" mean another branches from these verticies.

$$[2,[2,b1],4,[4,b2,b3],2,[1,b4],5]$$

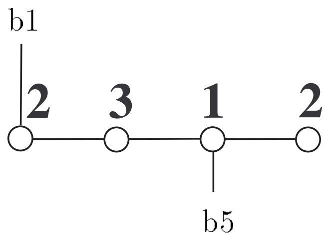
$$\Updownarrow$$



The list "b1:..." means the dual graph of the branch "b1".

b1:[2,3,[1,b5],2]

⇕



Therefor we get following dual graph.