

CoCoALib - Bug #1371

French students' example with GFan

25 Nov 2019 17:44 - John Abbott

Status:	In Progress	Start date:	25 Nov 2019
Priority:	Low	Due date:	
Assignee:		% Done:	10%
Category:	Improving	Estimated time:	0.00 hour
Target version:	CoCoALib-1.0	Spent time:	1.05 hour
Description			
I have just tried the French students' example as argument to GroebnerFanIdeals, and it computed all 167 GBases quite quickly. I had supposed it would get stuck on the "lex" basis. Why didn't it? What am I not understanding?			
Related issues:			
Related to CoCoA-5 - Design #984: GroebnerFanIdeals: order matrices sometimes...		New	26 Nov 2016

History

#1 - 25 Nov 2019 17:46 - John Abbott

Just for completeness here is the input:

```
I := ideal(x^2*y*z + x*y^3*z - 1, x^4*y*z - 1, x*y^4 + x*y*z-1);
GF := GroebnerFanIdeals(I); --> takes less than 5 sec.
```

#2 - 26 Nov 2019 15:10 - John Abbott

- Status changed from New to In Progress

- % Done changed from 0 to 10

The time taken depends on the current ring ordering!

If I create the ideal in the ring QQ[x,y,z] with DegRevLex, then the GFan computation takes about 2.2s.

If I create the ideal in the ring QQ[x,y,z] with Lex, then the GFan computation takes ages...

This cannot be right!?!

#3 - 26 Nov 2019 15:45 - Anna Maria Bigatti

Just for curiosity, this lex GBasis can be computed instantly using **GBasisByHomog(I)**.

Then, together with Robbiano, we also checked which ordering in GFan gives the same LT as lex (which is [y, x, z^18]).

This is the ordering, and indeed using it the GBasis is very fast:

```
/**/ P := NewPolyRing(QQ, "x,y,z", mat([[16,18,1], [257,288,0], [0,0,-1]]), 0);
/**/ use P;
/**/ I_P := ideal(x^2*y*z + x*y^3*z - 1, x^4*y*z - 1, x*y^4 + x*y*z-1);
/**/ GBasis(I_P);
```

#4 - 27 Nov 2019 15:53 - John Abbott

I find it quite strange that the term ordering used to obtain the same LT actually looks to be far away from lex:

Lex is

```
mat([[1, 0, 0],
     [0, 1, 0],
     [0, 0, 1]])
```

The ordering found is roughly:

```
mat([[1-eps, 1, 0],
     [1, 0, -1],
     [0, 0, -1]])
```

#5 - 11 Mar 2024 11:15 - John Abbott

- Related to Design #984: GroebnerFanIdeals: order matrices sometimes have "large" entries added