

CoCoA-5 - Feature #368

port SmithNormalForm (CoCoA-4) package to CoCoA-5

11 Jun 2013 18:33 - Anna Maria Bigatti

Status:	In Progress	Start date:	11 Jun 2013
Priority:	Normal	Due date:	
Assignee:	Anna Maria Bigatti	% Done:	10%
Category:	CoCoA-4 function to be added	Estimated time:	0.00 hour
Target version:	CoCoA-5.4.2	Spent time:	1.35 hour
Description			
Related issues:			
Related to CoCoA-5 - Support #242: CoCoA-5 Projects for students (e.g. credit...		In Progress	28 Sep 2012
Related to CoCoALib - Feature #1001: CoCoALib: ideas for student projects		In Progress	19 Jan 2017

History

#1 - 02 Apr 2014 17:34 - Anna Maria Bigatti

- Target version set to CoCoA-5.1.0 Easter14

#2 - 09 Apr 2014 15:54 - John Abbott

- Target version changed from CoCoA-5.1.0 Easter14 to CoCoA-5.1.1 Seoul14

#3 - 22 Jul 2014 09:30 - Anna Maria Bigatti

- Assignee set to Anna Maria Bigatti

- Target version changed from CoCoA-5.1.1 Seoul14 to CoCoA-5.???

#4 - 26 Jan 2018 15:23 - John Abbott

- Status changed from New to In Progress

- Target version changed from CoCoA-5.?? to CoCoA-5.2.4

- % Done changed from 0 to 10

Anna says she has "cleaned up" the original CoCoA-4 code so that CoCoA-5 accepts it. The code is in MatNormalForm.cpkg5 (original file was matrixnormalform.cpkg). The package exports two names **Smith** and **SmithFactor**.

There is no entry in the CoCoA-5 documentation. I would prefer **SNF** or **SmithNormalForm** rather than just Smith (or smith).

The code does not run properly. I got what I believe to be an infinite loop with the following input (given to a fresh CoCoA-5):

```
M := mat(ZZ, [[random(-9,9) | j in 1..4] | i in 1..4]);
Smith(M);
```

The matrix M above is

```
matrix(ZZ,
[[2, -8, -2, -1],
[-1, 6, -1, 4],
[-2, -1, -7, 0],
[-2, -3, -7, -3]])
```

#5 - 26 Jan 2018 15:27 - John Abbott

More failing examples:

```
matrix(ZZ,  
  [[6, -9, 0],  
   [2, -2, 0],  
   [6, -9, -4]])
```

```
matrix(ZZ,  
  [[6, -8],  
   [3, -6]])
```

```
matrix(ZZ,  
  [[4, 2],  
   [-3, 0]])
```

This one is diagonal, but still fails!

```
matrix(ZZ,  
  [[2, 0],  
   [0, 5]])
```

CONFIRMED 2021-03-15 the examples above take too long (or infinite loop)

#6 - 26 Jan 2018 15:28 - John Abbott

This should be ported to CoCoALib (once it has been corrected). It would surely be faster ;-)

#7 - 25 Jul 2018 15:31 - John Abbott

- Target version changed from CoCoA-5.2.4 to CoCoA-5.3.0

#8 - 01 Oct 2019 14:21 - John Abbott

- Target version changed from CoCoA-5.3.0 to CoCoA-5.4.0

I think Florian had done some implementing; perhaps we can delegate to him?

#9 - 15 Mar 2021 11:02 - John Abbott

The current version of the code needs to be improved:

```
/**/ M := mat(ZZ, [[PowerMod(i, j-1, NextPrime(999)) | i in 1..20] | j in 1..20]);  
/**/ MM := Smith(M);  
--> ERROR: Too many nested scopes
```

#10 - 19 Mar 2021 14:56 - John Abbott

- Related to Support #242: CoCoA-5 Projects for students (e.g. crediti F and tesi) added

#11 - 19 Mar 2021 14:56 - John Abbott

- Related to Feature #1001: CoCoALib: ideas for student projects added

#12 - 04 Nov 2021 23:27 - John Abbott

- Target version changed from CoCoA-5.4.0 to CoCoA-5.4.2

#13 - 22 Jan 2024 10:37 - John Abbott

JAA has some new code from Passau which should be in integrated...