CoCoALib - Slug #1118

SLUG: factorization of x^9999

08 Nov 2017 15:18 - John Abbott

Status:	In Progress		Start date:	08 Nov 2017
Priority:	Low		Due date:	
Assignee:			% Done:	10%
Category:	Improving		Estimated time:	0.00 hour
Target version:	CoCoALib-0.99880		Spent time:	0.35 hour

Description

CoCoA is slow at factorizing high powers of x. For example:

```
>>> t0 := CpuTime();   factor(x^99999); TimeFrom(t0);
record[RemainingFactor := 1, factors := [x], multiplicities := [99999]]
384.006
```

Complexity is **quadratic** in the exponent!

Related issues:

Related to CoCoALib - Feature #1513: Better test for univariate-ness (and bet...	**New**	**19 Oct 2020**

History

#1 - 19 Oct 2020 12:05 - John Abbott

I confirm that computation time increases quadratically (why?)
Also current (2020-10-19) speed is about the same as previously measured.

Better see what the profiler says...

#2 - 19 Oct 2020 12:33 - John Abbott

- Status changed from New to In Progress

- Target version changed from CoCoALib-1.0 to CoCoALib-0.99850

- % Done changed from 0 to 10

The quadratic behaviour derives from the GCD computation being between **dense** univariate polynomials.

A solution would be to have a "smarter" pseudo-sparse mapping to "dense univariate": namely, find exponents d and e such that $f(x) = x^e * g(x^d)$. These exponents can be found in linear time (in number of terms in the poly); indeed it could be combined with the recognition that the poly is univariate...
Perhaps this should be a separate issue?

#3 - 19 Oct 2020 14:48 - John Abbott

- Related to Feature #1513: Better test for univariate-ness (and better conversion) added

#4 - 31 Jan 2024 22:20 - John Abbott

- Target version changed from CoCoALib-0.99850 to CoCoALib-0.99880