EXAMPLE FILE FOR M2INTEX

PAUL ZINN-JUSTIN

1. INTRODUCTION

some basic examples:

```
i1 : R=QQ[x,y]; factor(x^3-y^3)
```

$\underline{o2}$ = $(x - y)(x^2 + x\,y + y^2)$

```
o2 : Expression of class Product
i3 : res coker vars R
```

$\underline{o3}$ = $R^1 \xleftarrow{(x\ y)} R^2 \xleftarrow{\left(\begin{smallmatrix} -y \\ x \end{smallmatrix}\right)} R^1 \xleftarrow{0} 0$

$\quad\quad\quad 0 \quad\quad\quad 1 \quad\quad\quad 2 \quad\quad\quad 3$

```
o3 : ChainComplex
i4 : OO_(Proj(R/(x^3-y^3)))^{1,2}
```

$\underline{o4}$ = $\mathcal{O}^1_{\mathrm{Proj}\left(\frac{R}{x^3-y^3}\right)}(1) \ \oplus \ \mathcal{O}^1_{\mathrm{Proj}\left(\frac{R}{x^3-y^3}\right)}(2)$

$\underline{o4}$: coherent sheaf on $\mathrm{Proj}\left(\frac{R}{x^3-y^3}\right)$, free

```
i5 : matrix {{1,2},{3,4}}
```

$\underline{o5}$ = $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

$\underline{o5}$: Matrix $\mathbb{Z}^2 \longleftarrow \mathbb{Z}^2$

more:

```
i6 : 318/46
```

$\underline{o6}$ = $\frac{159}{23}$

$\underline{o6}$: $\mathbb{Q}$

```
i7 : exp 3.73767
```

$\underline{o7}$ = 42.0000160321016

$\underline{o7}$: $\mathbb{R}$ (of precision 53)

strings:

```
i8 : "hehe"
```

$\underline{o8}$ = hehe

and nets:

```
i9 : "haha123456789"||"hoho!@#$%^&*("
```

$\underline{o9}$ = haha123456789
       hoho!@#$%^&*(

printing:

```
i10 : for i from 1 to 4 do print(i+ii)
```

$1 + \mathbf{i}$

$2 + \mathbf{i}$

$3 + \mathbf{i}$

$4 + \mathbf{i}$

2. HELP

┃ <u>i11</u> : help det
┃ <u>o11</u> =

determinant − determinant of a matrix

Synopsis

- Usage:
      det M
- Inputs:
      -- M, a square matrix
- Optional inputs:
      -- Strategy => ..., default value null, choose between Bareiss and Cofactor
         algorithms
- Outputs:
      -- a ring element, which is the determinant of M

Description

See also

- exteriorPower -- exterior power
- minors -- ideal generated by minors
- permanents -- ideal generated by square permanents of a matrix
- pfaffians -- ideal generated by Pfaffians

Ways to use determinant :

- "determinant(Matrix)"
- "determinant(MutableMatrix)"

For the programmer

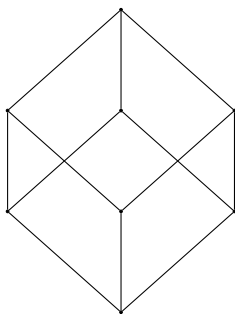   The object determinant is a method function with options.
┃ <u>o11</u> : DIV

3. PACKAGES

packages that have a `tex` output will work:
┃ <u>i12</u> : needsPackage "Posets";
┃ <u>i13</u> : booleanLattice 3

┃ <u>o13</u> =
┃ <u>o13</u> : Poset

4. Tricky examples

```
i14 : -- some tricky examples
```
A bunch of complicated cases: a multi-line example
```
      f = i -> (
      -- that's dumb
      i+1
      )
o14 = f
o14 : FunctionClosure
```
and another weirder one:
```
i15 : I=ideal 0; f = i -> (
o15 : Ideal of ℤ
      i+1)
o16 = f
o16 : FunctionClosure
```
finally:
```
i17 : a=1;b=2;
i19 : c=3;
```
That last one has no output.

5. Reusing output

The output o5 is $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$. The nonexistent output o18 is .

6. Inputting from external file

Some more code:
```
i20 : -- a test file
      R=QQ[x,y,z]
o20 = R
o20 : PolynomialRing
i21 : poincare ideal(x^2+y^2,x^3+z^3)
o21 = 1 - T^2 - T^3 + T^5
o21 : ℤ[T]
```