EXAMPLE FILE FOR M2INTEX

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1. Introduction

some basic examples:

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

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

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

$$o3 = R^1 \xleftarrow{\begin{pmatrix} x & y \end{pmatrix}} R^2 \xleftarrow{\begin{pmatrix} -y \\ x \end{pmatrix}} R^1 \xleftarrow{0} 0$$
$$\qquad\quad 0 \qquad\qquad 1 \qquad\qquad 2 \qquad 3$$

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

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

```
o4 : coherent sheaf on Proj (R/(x^3-y^3)), free
i5 : matrix {{1,2},{3,4}}
```

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

```
o5 : Matrix ZZ^2 <-- ZZ^2
```

more:

```
i6 : 318/46
```

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

```
o6 : QQ
i7 : exp 3.73767
```

$$o7 = 42.0000160321016$$

```
o7 : RR (of precision 53)
```

strings:

```
i8 : "hehe"
o8 = hehe
```

and nets:

```
i9 : "haha123456789"||"hoho!@#$%^&*("
o9 =  haha123456789
      hoho!@#$%^&*(
```

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

```
i11 : help det
o11 =
```

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)"

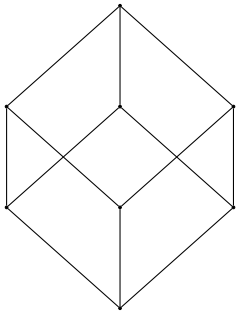
For the programmer

```
The object determinant is a method function with options.
o11 : DIV
```

3. Packages

packages that have a tex output will work:

```
i12 : needsPackage "Posets";
i13 : booleanLattice 3
```



```
o13 =
o13 : 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]
```