

EXAMPLE FILE FOR MERGETEX

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1. INTRODUCTION

some basic examples:

i1 : $R = \mathbb{Q}\mathbb{Q}[x, y]$; **factor**($x^3 - y^3$)

o2 = $(x - y)(x^2 + xy + y^2)$

o2 : Expression of class Product

i3 : **res coker vars** R

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

o3 : ChainComplex

i4 : $\text{OO}_-(\text{Proj}(R/(x^3 - y^3)))^{\{1, 2\}}$

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

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

i5 : **matrix** $\{\{1, 2\}, \{3, 4\}\}$

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

o5 : Matrix $\mathbb{Z}^2 \leftarrow \mathbb{Z}^2$

The code can also be inline: **gcd**(1300, 75). More:

i6 : 318/46

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

o6 : \mathbb{Q}

i7 : **exp** 3.73767

o7 = 42.0000160321016

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

strings and nets:

i8 : "hehe"

o8 = hehe

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

o9 = haha123456789
hoho!@#\\$%^&*(")

i10 : {oo,ooo}

o10 = $\left\{ \begin{array}{l} \text{haha123456789} \\ \text{hoho!@#\$%^&*(" , hehe} \end{array} \right\}$

o10 : List

printing:

```
i11 : for i from 1 to 3 do print(i^2+ii)
1 + i
4 + i
9 + i
```

2. HELP

```
i12 : help cohomology
o12 =
```

cohomology – general cohomology functor

Synopsis

- Optional inputs:
 - Degree => ..., default value 0,

Description

cohomology – a method name available for computing expressions of the forms $HH^i(X)$ and $HH^i(M,N)$.

If it is intended that i be of class ZZ , M be of class A , and N be of class B , then the method can be installed with

```
cohomology(ZZ, A, B) := opts -> (i,M,N) -> ...
```

See also

- homology – general homology functor
- HH – general homology and cohomology functor
- ScriptedFunctor – the class of all scripted functors

Ways to use cohomology :

- HH^{ZZ} ChainComplex – cohomology of a chain complex
- HH^{ZZ} ChainComplexMap – cohomology of a chain complex map
- HH^{ZZ} Module – local cohomology of a module
- HH^{ZZ} SheafOfRings – cohomology of a sheaf of rings on a projective variety
- HH^{ZZ} SumOfTwists – coherent sheaf cohomology module
- " HH^{ZZ} CoherentSheaf" – see $HH^{ZZ}(\text{ProjectiveVariety}, \text{CoherentSheaf})$ – cohomology of a coherent sheaf on a projective variety
- $HH^{ZZ}(\text{ProjectiveVariety}, \text{CoherentSheaf})$ – cohomology of a coherent sheaf on a projective variety

For the programmer

The object cohomology is a method function with options.

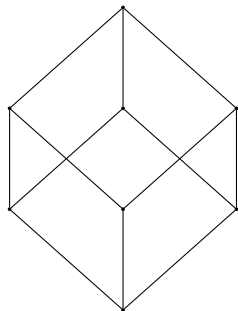
```
o12 : DIV
```

3. PACKAGES

packages that have a `tex` output will work:

```
i13 : needsPackage "Posets";
```

```
i14 : booleanLattice 3
```



```
o14 =
```

```
o14 : Poset
```

4. TRICKY EXAMPLES

```
i15 : -- some tricky examples
```

A bunch of complicated cases: a multi-line example

```
f = i -> (
  -- that's dumb
  i+1
)
```

```
o15 = f
```

```
o15 : FunctionClosure
```

and another weirder one:

```
i16 : I=ideal 0; f = i -> (
```

```
o16 : Ideal of ℤ
      i+1)
```

```
o17 = f
```

```
o17 : FunctionClosure
```

finally:

```
i18 : a=1;b=2;
```

```
i20 : c=3;
```

That last one has no output.

5. REUSING OUTPUT

The output `o5` is $(\frac{1}{3} \frac{2}{4})$. The nonexistent output `o18` is .

6. INPUTTING FROM EXTERNAL FILE

Some more code:

```
i21 : -- a test file
```

```
R=QQ[x,y,z]
```

```
o21 = R
```

```

| o21 : PolynomialRing
| i22 : poincare ideal(x^2+y^2,x^3+z^3)
| o22 =  $1 - T^2 - T^3 + T^5$ 
| o22 :  $\mathbb{Z}[T]$ 

```

7. CHANGING KEY/VALUES

```

| i23 : "some_weird_spacing_and_string_style"
| o23 = some weird spacing and string style

```