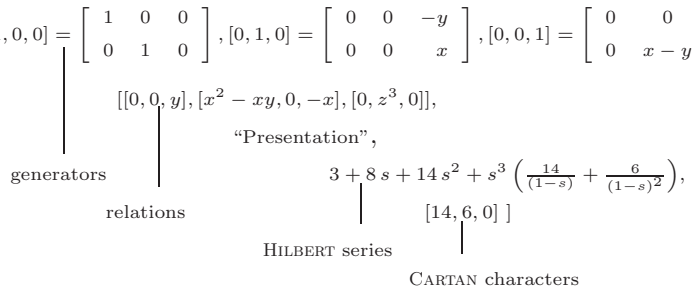
FIGURE 1. A module of homomorphisms between two modules over $R = \mathbb{Q}[x, y, z]$ with `Involutive`



Hom

In this example we compute a module of homomorphisms.

```
> restart:
> with(Involutive): with(homalg):
```

Specify the `homalg`-table of the ring package `Involutive`:

```
> RPI:=‘Involutive/homalg‘;
```

$$RPI := Involutive/homalg$$

Use the ring package `Involutive` as the default ring package:

```
> ‘homalg/default‘:=RPI;
```

$$homalg/default := Involutive/homalg$$

Define the ring $R = \mathbb{Q}[x, y, z]$:

```
> var:=[x,y,z];
```

$$var := [x,\ y,\ z]$$

```
> K:=Cokernel([[x,y,0],[x^2,y^2,0],[x^3,y^3,z^3]],var);
```

$$K := [[[1,\ 0,\ 0] = [1,\ 0,\ 0],\ [0,\ 1,\ 0] = [0,\ 1,\ 0],\ [0,\ 0,\ 1] = [0,\ 0,\ 1]],$$
$$[[x,\ y,\ 0],\ [0,\ x\,y - y^2,\ 0],\ [0,\ 0,\ z^3]],\ \text{“Presentation”},$$
$$3 + 8\,s + 14\,s^2 + s^3\,(\frac{14}{1-s} + \frac{6}{(1-s)^2}),\ [14,\ 6,\ 0]]$$

```
> L:=Cokernel([[x,y]],var);
```

$$L := [[[1,\ 0] = [1,\ 0],\ [0,\ 1] = [0,\ 1]],\ [[x,\ y]],\ \text{“Presentation”},$$
$$2 + s\,(\frac{2}{1-s} + \frac{2}{(1-s)^2} + \frac{1}{(1-s)^3}),\ [2,\ 2,\ 1]]$$

Compute the module of homomorphisms $\mathrm{Hom}_R(L, K)$ (see Figure 1):

```
> hom:=Hom(L,K,var);
```

$$hom := [[[1,\ 0,\ 0] = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix},\ [0,\ 1,\ 0] = \begin{bmatrix} 0 & 0 & -y \\ 0 & 0 & x \end{bmatrix},\ [0,\ 0,\ 1] = \begin{bmatrix} 0 & 0 & 0 \\ 0 & -y + x & 0 \end{bmatrix}],$$
$$[[0,\ 0,\ y],\ [x^2 - x\,y,\ 0,\ -x],\ [0,\ z^3,\ 0]],\ \text{“Presentation”},$$
$$3 + 8\,s + 14\,s^2 + s^3\,(\frac{14}{1-s} + \frac{6}{(1-s)^2}),\ [14,\ 6,\ 0]]$$

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Date: 2004-11-24
Last modified: 2007-06-09 22:04

References

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