gfun[poltodiffeq] - determine the differential equation satisfied by a polynomial in holonomic functions

Calling Sequence

poltodiffeq(**P**, **listdiffeq**, **list_unknowns**, **y(z)**)

Parameters

`P` - polynomial in **z** and the (possibly differentiated) variables in **list_unknowns**

`listdiffeq` - list containing, for each of the variables in **list_unknowns**, either a linear differential equation or a set containing the equation together with initial conditions

`list_unknowns` - list of the unknowns **[y1(z), y2(z),...]**, in the same order as in **listdiffeq**

`y,z` - the name of the holonomic function and the generic variable

Description

- If **y1(z)**, **y2(z)**,... are holonomic functions solutions of **listdiffeq[1]**, **listdiffeq[2]**,..., **poltodiffeq** outputs a linear differential equation verified by **P(z,y1(z),...)**.

Examples

```
> with(gfun):
  Sin:={diff(y1(z),z,z)=-y1(z),y1(0)=0,D(y1)(0)=1}:
  Cos:={diff(y2(z),z,z)=-y2(z),y2(0)=1,D(y2)(0)=0}:
  poltodiffeq(y1(z)^2+y2(z)^2,[Sin,Cos],[y1(z),y2(z)],y(z));
```

$$\left\{D(y)(0)=0,\ y(0)=1,\ D^{(2)}(y)(0)=0,\ \frac{d^3}{dz^3}y(z)+4\left(\frac{d}{dz}y(z)\right)\right\} \tag{2.1}$$

```
> poltodiffeq(y1(z)^2+diff(y1(z),z)^2,[Sin],[y1(z)],y(z));
```

$$\left\{\frac{d}{dz}y(z),\ y(0)=1\right\} \tag{2.2}$$

See Also

gfun, gfun[parameters], gfun[diffeq+diffeq], gfun[diffeq*diffeq], gfun[poltorec]