

gfun[diffeqtohomdiffeq] - make a differential equation homogeneous

gfun[rectohomrec] - make a recurrence homogeneous

Calling Sequence

diffeqtohomdiffeq(**deq**,**y(z)**)

rectohomrec(**rec**,**u(n)**)

Parameters

deq - linear differential equation in **y(z)** with polynomial coefficients

rec - linear recurrence with polynomial coefficients

y, z - function and variable of the differential equation

u, n - variable and index of the recurrence

Description

- If **deq** is not homogeneous, then **diffeqtohomdiffeq** produces a differential equation of order increased by one which is homogeneous and cancels all the solutions of the original equation. If **deq** is homogeneous, it is unchanged.
- If **rec** is not homogeneous, then **rectohomrec** produces a recurrence of order increased by one which is homogeneous and cancels all the solutions of the original equation. If **rec** is homogeneous, it is unchanged.

Examples

```
> with(gfun):  
deq:=diff(y(x),x)*(x-1)+2*y(x)-2*x-3:  
diffeqtohomdiffeq(deq,y(x));
```

$$4y(x) + (-4x - 11) \left(\frac{d}{dx} y(x) \right) + (3 - 2x^2 - x) \left(\frac{d^2}{dx^2} y(x) \right) \quad (2.1)$$

```
> diffeqtohomdiffeq({deq,y(0)=2},y(x));
```

$$\left\{ 4y(x) + (-4x - 11) \left(\frac{d}{dx} y(x) \right) + (3 - 2x^2 - x) \left(\frac{d^2}{dx^2} y(x) \right), y(0) = 2, D(y)(0) \right. \\ \left. = 1 \right\} \quad (2.2)$$

```
> rec:=u(n+1)=u(n)+n^2+1:  
rectohomrec(rec,u(n));
```

$$(-2 - n^2 - 2n) u(n) + (3 + 2n^2 + 2n) u(n+1) + (-n^2 - 1) u(n+2) \quad (2.3)$$

$$\begin{array}{l} \text{> } \text{rectohomrec}(\{\text{rec}, u(0)=1\}, u(n)); \\ \{(-2 - n^2 - 2n) u(n) + (3 + 2n^2 + 2n) u(n+1) + (-n^2 - 1) u(n+2), u(0) = 1, \\ u(1) = 2\} \end{array} \quad (2.4)$$

▼ **See Also**

[gfun](#)