

gfun[diffeqtorec] - convert a linear differential equation into a recurrence

Calling Sequence

diffeqtorec(**deq**, **y(z)**, **u(n)**)

Parameters

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

y, z - name and variable of the function

u, n - name and index of the recurrence

Description

- Let **f** be a power series solution of the differential equation. If **u(n)** is the n-th Taylor coefficient of **f** around zero, the procedure outputs a linear recurrence for the numbers **u(n)**, with rational coefficients in **n**.
- The syntax is the same as that of [dsolve](#). Combined with [algeqtodiffeq](#)gfun[algeqtodiffeq], this procedure produces a linear recurrence for the Taylor coefficients of an algebraic function.

Examples

```
> with(gfun):  
diffeqtorec(y(z)=a*diff(y(z),z),y(z),v(n));  
  
v(n) + (-a n - a) v(n + 1) (2.1)
```

```
> deq:=algeqtodiffeq(y=1+z*(y^2+y^3),y(z),{ }):  
diffeqtorec(deq,y(z),u(m));  
  
{u(0) = 1, (-m - 2 m^2) u(m) + (-9 - 30 m - 18 m^2) u(m + 1) + (279 + 227 m  
+ 46 m^2) u(m + 2) + (-26 m - 42 - 4 m^2) u(m + 3), u(1) = 2, u(2) = 10} (2.2)
```

See Also

[gfun](#), [gfun\[algeqtodiffeq\]](#), [gfun\[rectodiffeq\]](#), [dsolve](#), [dsolve\[formal_series\]](#)