gfun[invborel] - convert an exponential into ordinary recurrence

Calling Sequence

invborel(**expr**, **a(n)**, **t**)

Parameters

`expr` - linear recurrence with polynomial coefficients

`a,n` - name and index of the recurrence

`t` - (optional) 'diffeq'

Description

- If **(a(n),n=0..infinity)** is the sequence of numbers defined by the recurrence **expr**, the procedure computes the recurrence for the numbers **n!*a(n)**.
- If the optional fourth argument 'diffeq' is given, **expr** is taken as a linear differential equation with polynomial coefficients, and the procedure outputs a linear differential equation satisfied by its inverse Borel transform.

Laplace is used as a synonym of **invborel.**

Examples

```
> with(gfun):
  rec:={a(n)=n*a(n-1)+a(n-2),a(0)=0,a(1)=1}:
  deq:=invborel(rec,a(n));
```

$$deq := \{a(0) = 0, a(1) = 1, (-2 - n^2 - 3n)\, a(n) + (-4n - 4 - n^2)\, a(n+1) + a(n+2)\} \quad (2.1)$$

```
> rec2:=rectodiffeq(deq,a(n),f(t));
```

$$rec2 := \left\{(-2t^2 - t + 1)\, f(t) + (-4t^3 - 3t^2)\left(\frac{d}{dt} f(t)\right) + (-t^4 - t^3)\left(\frac{d^2}{dt^2} f(t)\right) - t, f(0) = 0, D(f)(0) = 1\right\} \quad (2.2)$$

```
> deq2:=borel(rec2,f(t),'diffeq');
```

$$deq2 := \left\{(-t^2 - t + 1)\, f(t) - \left(\frac{d}{dt} f(t)\right) t^2 - t, f(0) = 0, D(f)(0) = 1\right\} \quad (2.3)$$

```
> diffeqtorec(deq2,f(t),a(n));
```

$$\{a(0) = 0, a(1) = 1, -a(n) + (-n - 2)\, a(n+1) + a(n+2)\} \quad (2.4)$$

See Also

gfun, gfun[borel]