

gfun[listtoalgeq] - find an algebraic equation satisfied by a generating function

gfun[seriestoalgeq] - find an algebraic equation satisfied by a series

Calling Sequence

listtoalgeq (**l**, **y(x)**, <[typelist]>)

seriestoalgeq (**s**, **y(x)**, <[typelist]>)

Parameters

l - list

s - series

y, z - name of the unknown function and the generic variable

[**typelist**] - (optional) list of generating function types

Description

- The procedures **listtoalgeq** and **seriestoalgeq** compute a polynomial equation in **y** and **x** satisfied by the generating function **y(x)** of the expressions in **l** or **s**, this generating function being of one of the types specified by **typelist**, for example, ordinary (ogf) or exponential (egf). For a full list of available choices see [gftypes](#).
- If **typelist** contains more than one element, these types are tried in order.
- If **typelist** is not provided, the default **optionsgf=['ogf','egf']** is used. The output is a list whose first element is the polynomial in **y(x)** and **x** that was found, and whose second element is the type to which it corresponds.
- In the current implementation, the maximal degree of **y** is 6 and the maximum degree of the coefficients is 3. This can be changed by modifying the variables [gfun\[maxdegeqn\]](#) and [gfun\[maxdegcoeff\]](#).
- If sufficiently many terms are given, and no solution is found, then generating function does not satisfy any algebraic equation of degree less or equal to [gfun\[maxdegeqn\]](#) with coefficients of degree less or equal to [gfun\[maxdegcoeff\]](#).

Examples

```
> with(gfun):  
l:= [1, 1, 2, 5, 14, 42, 132, 429, 1430, 4862, 16796, 58786]:  
listtoalgeq(l,y(x));  
  
[-1 + y(x) - x y(x)^2, ogf] (2.1)
```

```
> s:=series((1-sqrt(1-4*x)),x,9);  
  
s := 2 x + 2 x^2 + 4 x^3 + 10 x^4 + 28 x^5 + 84 x^6 + 264 x^7 + 858 x^8 + O(x^9) (2.2)
```

```
> seriestoalgeq(s,y(x));
```

$$\left[\left[4x - 2y(x) + y(x)^2, \text{ogf} \right] \right] \quad (2.3)$$

▼ **See Also**
[gfun](#), [gfun\[parameters\]](#)