```
> restart;
>
```

Load TruncatedSeries2022.zip from
http://www.ccas.ru/ca/_media/truncatedseries2022.zip
This archive includes two files: maple.ind and maple.lib.
Put these files to some directory, for example to ''/usr/userlib''

```
> libname := "/usr/userlib", libname :
>
> with(TruncatedSeries) :
> s1 := Matrix(3, 3, [[O(x^3), O(x^3), O(x^3)], [O(x^3),K 1 + x + x^2 + O(x^3), O(x^3)], [O(x^3),K 1 + x + x^2 + O(x^3), O(x^3)]]) · theta(y(x), x, 2) + Matrix(3, 3, [[1 + x + O(x^2), O(x^3), O(x^3)], [O(x^3), 2K 4*xK 4*x^2 + O(x^3), O(x^3)], [1 + x + O(x^2), 2K 4*xK 4*x^2 + O(x^3), 1 + O(x^5)]]) · theta(y(x), x, 1) + Matrix(3, 3, [[K 1 + 1/2*x^2 + O(x^3), O(x^3), O(x^3)], [O(x^3), O(x^6), O(x^3)], [K 1K x + 1/2*x^2 + O(x^3), K 1 + O(x^4), O(x^3)]]) · y(x);
```

$$s1 := \begin{bmatrix} O(x^3) & O(x^3) & O(x^3) \\ O(x^3) & K\ 1+x+x^2+O(x^3) & O(x^3) \\ O(x^3) & K\ 1+x+x^2+O(x^3) & O(x^3) \end{bmatrix} \cdot \theta(y(x), x, 2) + \begin{bmatrix} 1+x+O(x^2) & O(x^3) & O(x^3) \\ O(x^3) & 2K\ 4\,xK\ 4\,x^2+O(x^3) & O(x^3) \\ 1+x+O(x^2) & 2K\ 4\,xK\ 4\,x^2+O(x^3) & 1+O(x^5) \end{bmatrix} \cdot \theta(y(x), x, 1) + \begin{bmatrix} K\ 1+\frac{x^2}{2}+O(x^3) & O(x^3) & O(x^3) \\ O(x^3) & O(x^6) & O(x^3) \\ K\ 1K\ x+\frac{x^2}{2}+O(x^3) & K\ 1+O(x^4) & O(x^3) \end{bmatrix} \cdot y(x) \qquad \textbf{(1)}$$

```
> LaurentSolution(s1, y(x));
```

$$\Big[\Big[K\ x^2\,\_c_1 + x\,\_c_1 + O(x^3),\ x^2\,\_c_2 + O(x^3),\ \_c_3 + x^2\left(\frac{\_c_1}{2} + \frac{\_c_2}{2}\right) + O(x^3)\Big], \Big[K\ x^2\,\_c_1 + x\,\_c_1 + O(x^3),\ x^2\,\_c_2 K\ \frac{4\,x^3\,\_c_2}{3} + O(x^4),\ x^2\left(\frac{\_c_1}{2} + \frac{\_c_2}{2}\right) + O(x^3)\Big], \Big[K\ x^2\,\_c_1 + x\,\_c_1 + O(x^3),\ O(x^3),\ \_c_3 + \frac{x^2\,\_c_1}{2} + O(x^3)\Big], \Big[K\ x^2\,\_c_1 + x\,\_c_1 + O(x^3),\ O(x^4),\ \frac{x^2\,\_c_1}{2} + O(x^3)\Big], \Big[x^2\,\_c_2 K\ x\,\_c_2 + O(x^3),\ x^2\,\_c_2 K\ \frac{4\,x^3\,\_c_2}{3} + O(x^4),\ O(x^3)\Big], \Big[O(x^3),\ x^2\,\_c_2 + O(x^3),\ \_c_3 + \frac{x^2\,\_c_2}{2} + O(x^3)\Big], \big[O(x^3),\ O(x^3),\ \_c_3 + O(x^3)\big], \Big[O(x^5),\ x^2\,\_c_2 K\ \frac{4\,x^3\,\_c_2}{3} + O(x^5),\ \frac{x^2\,\_c_2}{2} K\ \frac{4\,x^3\,\_c_2}{9} + O(x^5)\Big]\Big] \qquad \textbf{(2)}$$

```
>
> s2 := Matrix(2, 2, [[1 + O(x^5), O(x^5)], [O(x^5), 1K x + O(x^5)]]) · theta(y(x), x, 1) + Matrix(2, 2, [[O(x^5),K 1 + O(x^5)], [K x + 2*x^2 + 2*x^3 + 2*x^4 + O(x^5), K 2 + 4*x + O(x^5)]]) · y(x) = 0;
```

(3)

$$s2 := \begin{bmatrix} 1 + \mathrm{O}(x^5) & \mathrm{O}(x^5) \\ \mathrm{O}(x^5) & 1\,\mathrm{K}\;x + \mathrm{O}(x^5) \end{bmatrix} \cdot \theta(y(x), x, 1) + \begin{bmatrix} \mathrm{O}(x^5) & \mathrm{K}\;1 + \mathrm{O}(x^5) \\ \mathrm{K}\;x + 2x^2 + 2x^3 + 2x^4 + \mathrm{O}(x^5) & \mathrm{K}\;2 + 4x + \mathrm{O}(x^5) \end{bmatrix} \cdot y(x) = 0 \qquad (3)$$

> *LaurentSolution*(*s2*, *y*(*x*));

$$[[\mathrm{K}\;x^3\,\_c_2 + x^2\,\_c_2 + \mathrm{O}(x^7), \mathrm{K}\;3x^3\,\_c_2 + 2x^2\,\_c_2 + \mathrm{O}(x^7)], [\mathrm{K}\;x^3\,\_c_2 + x^2\,\_c_2\,\mathrm{K}\;x\,\_c_1 + \_c_1 + \mathrm{O}(x^5), \mathrm{K}\;3x^3\,\_c_2 + 2x^2\,\_c_2\,\mathrm{K}\;x\,\_c_1 + \mathrm{O}(x^5)]] \qquad (4)$$

> *s3* := *Matrix*(2, 2, [[*x* + O(*x*^3), O(*x*^3)], [1 + O(*x*^3), *x* + O(*x*^3)]]) · theta(*y*(*x*), *x*, 1) + *Matrix*(2, 2, [[O(*x*^3), O(*x*^3)], [O(*x*^3), 3***x* + O(*x*^3)]]) · *y*(*x*);

$$s3 := \begin{bmatrix} x + \mathrm{O}(x^3) & \mathrm{O}(x^3) \\ 1 + \mathrm{O}(x^3) & x + \mathrm{O}(x^3) \end{bmatrix} \cdot \theta(y(x), x, 1) + \begin{bmatrix} \mathrm{O}(x^3) & \mathrm{O}(x^3) \\ \mathrm{O}(x^3) & 3x + \mathrm{O}(x^3) \end{bmatrix} \cdot y(x) \qquad (5)$$

By the last version, the procedure can search for Laurent solutions:

> *LaurentSolution*(*s3*, *y*(*x*));

$$[[\_c_1 + \mathrm{O}(x^2), \mathrm{O}(x)]] \qquad (6)$$

>