1 kovacicODE

1.1 Introduction to kovacicODE

1.2 Definitions for kovacicODE

`kovacicODE` (*expr*, *y*, *x*) [Function]

`kovacicODE` is an implementation of the Kovacic algorithm for finding the solution of second order linear ordinary differential equations (ODEs) with Liouvillian solutions. If the ODE has a Liouvillian solution, `kovacicODE` finds and returns the solution. If the ODE does not have a Liouvillian solution, `kovacicODE` returns `false`.

`load("kovacicODE")` loads this function.

Example:

Example 1 from "On Liouvillian Solutions of Linear Differential Equations" by F. Unger (1992), *Applicable Algebra in Engineering, Communication and Computing*, volume 2, issue 3, pp 171–193. `DEBUGFLAG` controls debugging output in `kovacicODE`; we'll set it to 0 to suppress debugging output in this example.

```
(%i1) load (kovacicODE) $
(%i2) eq : 'diff(y,x,2) - 'diff(y,x,1)/x+x^2*y/(x^4+2*x^2+1) = 0;
                          dy
                   2      --         2
                  d y     dx        x  y
(%o2)             --- - -- + ------------- = 0
                    2     x      4      2
                  dx           x  + 2 x  + 1
(%i3) DEBUGFLAG : 0 $
(%i4) kovacicODE (eq, y, x);
                      2            2                    2
(%o4) [y = %k2 sqrt(x  + 1) log(x  + 1) + %k1 sqrt(x  + 1)]
```

Appendix A Function and variable index