Solution of Partial Differential Equation using Oberst-Riquier algorithm

Here Oberst-Riquier algorithm is used for solving the given set of PDE's. The output of this algorithm is in a power series form. The program first asks for the number of independent variables, after that it asks for the partial differential equation(s). After that the initial conditions must be given as specified. The final solution will be saved in a text file in the current directory named 'output.txt'. To see the solution in the terminal type 'solution'.

Once the number of independent variables are defined, variables in d i.e. d1,d2,d3...and variables in x i.e. x1,x2,x3... are created as required. Here d*i* signifies partial derivative with respect to x*i*. Now, the user needs to give the PDE's in polynomial form in terms of d1, d2, d3...

EXAMPLE 1:

-Number of independent variables: 2
-Defining d1, d2
-Number of partial differential equation(s): 1

-Enter the f(d) in variables of d
-f1= d1-d2^2

-groebner basis generated in 0.049 secs
-all monomials generated in 0.051 secs
-standard monomial calculated in 0.308 secs

-Give initial condition of pde in this form:
-Poly(x2)*exp(x2)

-Enter the initial condition: x2*e^(5*x2)

-evaluation complete

-The solution of the PDE's are saved in file named solution.txt
-To see the solution in the terminal, type 'solution'

EXAMPLE 2:

-Number of independent variables: 3
-Defining d1, d2, d3
-Number of partial differential equation(s): 2

-Enter the f(d) in variables of d
-f1= d1-d2*d3^2
-f2= d2+d3*d1^2+3

-Groebner basis generated in 0.076 secs

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-all monomials generated in 0.086 secs
-standard monomial calculated in 3.706 secs

-Give the initial condition in terms of 1, x3, x3^2, x3^3, x3^4, x3^5, x3^6, x3^7, x3^8, x3^9, x3^10,x2, x2*x3, x2*x3^2, x2*x3^3, x2*x3^4, x2*x3^5, x2*x3^6, x2*x3^7, x2*x3^8, x2*x3^9, x2*x3^10, x2*x3^11,x2*x3^12, x2^2, x2^2*x3, x2^2*x3^2, x2^2*x3^3, x2^2*x3^4, x2^3, x2^3*x3, x2^3*x3^2, x2^3*x3^3, x2^3*x3^4, x2^4, x2^4*x3, x2^4*x3^2, x2^4*x3^3, x2^4*x3^4, x2^5, x2^5*x3, x2^5*x3^2, x2^5*x3^3, x2^5*x3^4, x2^6, x2^6*x3,x2^6*x3^2, x2^6*x3^3, x2^6*x3^4, x2^7, x2^7*x3, x2^7*x3^2, x2^7*x3^3, x2^7*x3^4, x2^8, x2^8*x3, x2^8*x3^2,x2^8*x3^3, x2^8*x3^4, x2^9, x2^9*x3, x2^9*x3^2, x2^9*x3^3, x2^9*x3^4, x2^10, x2^10*x3, x2^10*x3^2, x2^10*x3^3, x2^10*x3^4, x2^11, x2^11*x3, x2^11*x3^2, x2^11*x3^3, x2^11*x3^4, x2^12, x2^12*x3, x2^12*x3^2, x2^12*x3^3, x2^12*x3^4, x2^13, x2^13*x3, x2^13*x3^2, x2^13*x3^3, x2^13*x3^4, x2^14, x2^14*x3, x2^14*x3^2, x2^14*x3^3, x2^14*x3^4, x2^15, x2^15*x3, x2^15*x3^2, x2^15*x3^3, x2^15*x3^4, x2^16, x2^16*x3, x2^16*x3^2, x2^16*x3^3, x2^16*x3^4...

-Enter the initial condition: e^5*x2 + (x2+x2^2)*e^x3

-evaluation complete

-The solution of the PDE's are saved in file named solution.txt
-To see the solution in the terminal, type 'solution'

HOW TO RUN THE CODE IN SAGE:

First open SAGE from the terminal. Then you can load a file in a Sage session with the command "load".

example:

if your file is in the current directory where you started sage then:
-load("your_file.sage")

if your file is in another directory then :
-load("~/the_file_location/your_file.sage")

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