DIFFERENTIAL EQUATION of 1st ORDER - NUMERICAL RESULTS by THE METHOD of RUNGE-KUTTA v1.02

The program finds for a differential equation ( d. e. ) of 1st order given as y'=f(x,y) the numerical approximation by the method of RUNGA-KUTTA 4th order and provides a plot of the result.

Necessary inputs are the function itself, the interval x1<=x<=x2 to be scrutinized, the increment of steps h and the initial conditions x0, y0(x0). The result is stored in matrix [A] as [xi yi].

Start RUKUTTA1, then follow the prompts to make your input (see example).

*EXAMPLE:*

Find the numerical approximations of y’ = 1/(2\*(y-x3)) + 3x2  within 1 <= x <= 2 , initial condition: y(1) = 2. Assume h = 0.1 as increment .

Start RUKUTTA1, then enter on the prompts:

Analyze

1: New system enter

y’ (x,y): 1/(2(Y-X^3))+3X^2 enter

Initial x0: 1 enter

Initial y0: 2 enter

Intervall x1<=x<=x2

x1 : 1 enter

x2 : 2 enter

Increment h: .1 enter

After the calculation is finished the screen displays:

L1 L2 = [x y]

Press [stat], then 1:Edit

Following these command opens the list-screen to see the numerical results :

*L1 L2* *exact:* (The *exact* solution of the differential

1 2 *2* equation is: y = x3 + sqrt(x) )

* 1. 2.37981043 *2.3798088*
  2. 2.82344835 *2.8234451*

…..

1.5 4.59975341 *4.5997449*

…..

Scroll down:

2 9.414231956 *9.4142136*

Now press the graph-key to get a plot of all pairs [x y].

To change initial conditions and/or the interval of analysis for the same d. e. restart the program and select: 2: Last system .

*clan.dachselt@t-online.de*