

The Runge-Kutta Calculator Program (TI-89)

The following calculator program was Adapted for the TI-89. To use it, make sure that your differential equation is in the form $dy/dx = f(x,y)$. Type the equation $f(x,y)$ in "y1=". Now you're ready to run the program where H is the step size, N is the number of steps you want to go, and (X0, Y0) is your initial condition. Note: you will only run the RK program but you need both of the programs for it to work correctly. Also, make sure that you name both programs exactly rk() and rksbr().

Like with the Euler program, the "continue?" feature asks you whether you want the program to calculate the next step or not. Like before 1 = yes and 0 = no.

The RK Program

```
:rk()
:ClrHome
:Disp " "
:Disp "x0,y0 ="
:Input u
:Input v
:Local q
:Define q=1
:While q=1
:Prompt h,n
:While q=1
:For j,1,n,1
:rksbr()
:EndFor
:ClrHome
:Disp " "
:Disp "x ="
:Disp u
:Disp "y ="
:Disp v
:Disp " "
:Input "continue",q
:EndWhile
:Input "new h and n",q
:EndWhile
:Disp "done"
:EndPrgm
```

The RKSBR Program

```
:rksbr()
:Prgm
:u→x
:v→y
:h*y1(x)→k
:k→s
:u+h/2→x
:For i,1,2,1
:v+k/2→y
:h*y1(x)→k
:s+2*k→s
:EndFor
:u+h→x
:v+k→y
:v+(s+h*y1(x))/6→v
:x→u
:EndPrgm
```