

$$\begin{aligned} &> \text{restart;} \\ &> \text{eq:=D(y)=(s->f(s,y(s)));} \\ & \quad \text{eq} := D(y) = (s \mapsto f(s, y(s))) \end{aligned} \quad (1)$$

$$\begin{aligned} &> \text{yp:=y(xn-h)+2*h*f(xn,y(xn));} \\ & \quad \text{yp} := y(xn-h) + 2 h f(xn, y(xn)) \end{aligned} \quad (2)$$

$$\begin{aligned} &> \text{ynp1:=y(xn)+h/2*(f(xn,y(xn))+f(xn+h,yp));} \\ & \quad \text{ynp1} := y(xn) + \frac{h (f(xn, y(xn)) + f(xn+h, y(xn-h) + 2 h f(xn, y(xn))))}{2} \end{aligned} \quad (3)$$

$$\begin{aligned} &> \text{r:=y(xn+h)-ynp1;} \\ & \quad \text{r} := y(xn+h) - y(xn) \\ & \quad \quad - \frac{h (f(xn, y(xn)) + f(xn+h, y(xn-h) + 2 h f(xn, y(xn))))}{2} \end{aligned} \quad (4)$$

$$\begin{aligned} &> \text{subs(h=0,r);} \\ & \quad 0 \end{aligned} \quad (5)$$

$$\begin{aligned} &> \text{T1:=diff(r,h);} \\ & \quad \text{T1} := D(y)(xn+h) - \frac{f(xn, y(xn))}{2} - \frac{f(xn+h, y(xn-h) + 2 h f(xn, y(xn)))}{2} \\ & \quad \quad - \frac{1}{2} (h (D_1(f)(xn+h, y(xn-h) + 2 h f(xn, y(xn)))) + D_2(f)(xn+h, y(xn-h) \\ & \quad \quad - h) + 2 h f(xn, y(xn))) (-D(y)(xn-h) + 2 f(xn, y(xn)))) \end{aligned} \quad (6)$$

$$\begin{aligned} &> \text{dr:=eval(subs(eq,T1));} \\ & \quad \text{dr} := f(xn+h, y(xn+h)) - \frac{f(xn, y(xn))}{2} \\ & \quad \quad - \frac{f(xn+h, y(xn-h) + 2 h f(xn, y(xn)))}{2} - \frac{1}{2} (h (D_1(f)(xn+h, y(xn-h) \\ & \quad \quad - h) + 2 h f(xn, y(xn))) + D_2(f)(xn+h, y(xn-h) + 2 h f(xn, y(xn))) (-f(xn-h, \\ & \quad \quad y(xn-h) + 2 f(xn, y(xn)))) \end{aligned} \quad (7)$$

$$\begin{aligned} &> \text{subs(h=0,dr);} \\ & \quad 0 \end{aligned} \quad (8)$$

$$\begin{aligned} &> \text{ddr:=eval(subs(eq,diff(dr,h)));} \\ & \quad \text{ddr} := D_1(f)(xn+h, y(xn+h)) + D_2(f)(xn+h, y(xn+h)) f(xn+h, y(xn+h)) \\ & \quad \quad - D_1(f)(xn+h, y(xn-h) + 2 h f(xn, y(xn))) - D_2(f)(xn+h, y(xn-h) \\ & \quad \quad + 2 h f(xn, y(xn))) (-f(xn-h, y(xn-h)) + 2 f(xn, y(xn))) \\ & \quad \quad - \frac{1}{2} (h (D_{1,1}(f)(xn+h, y(xn-h) + 2 h f(xn, y(xn)))) + D_{1,2}(f)(xn+h, y(xn-h) \\ & \quad \quad - h) + 2 h f(xn, y(xn))) (-f(xn-h, y(xn-h)) + 2 f(xn, y(xn))) \\ & \quad \quad + (D_{1,2}(f)(xn+h, y(xn-h) + 2 h f(xn, y(xn)))) + D_{2,2}(f)(xn+h, y(xn-h) \\ & \quad \quad + 2 h f(xn, y(xn))) (-f(xn-h, y(xn-h)) + 2 f(xn, y(xn)))) (-f(xn-h, \\ & \quad \quad y(xn-h) + 2 f(xn, y(xn))) + D_2(f)(xn+h, y(xn-h) + 2 h f(xn, \\ & \quad \quad y(xn))) (D_1(f)(xn-h, y(xn-h)) + D_2(f)(xn-h, y(xn-h)) f(xn-h, y(xn-h)))) \end{aligned} \quad (9)$$

$$\begin{aligned} &> \text{subs(h=0,ddr);} \\ & \quad 0 \end{aligned} \quad (10)$$

> d3r:=eval(subs(eq,diff(DDR,h))):

> subs(h=0,d3r);

$$\begin{aligned} & - \frac{D_{1,1}(f)(xn, y(xn))}{2} - \frac{D_{1,2}(f)(xn, y(xn)) f(xn, y(xn))}{2} \\ & - \frac{(D_{1,2}(f)(xn, y(xn)) + D_{2,2}(f)(xn, y(xn)) f(xn, y(xn))) f(xn, y(xn))}{2} \\ & - \frac{D_2(f)(xn, y(xn)) (D_1(f)(xn, y(xn)) + D_2(f)(xn, y(xn)) f(xn, y(xn)))}{2} \end{aligned}$$

(11)