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Maxima 5.10.0 http://maxima.sourceforge.net
Using Lisp GNU Common Lisp (GCL) GCL 2.6.7 (aka GCL)
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Dedicated to the memory of William Schelter.
This is a development version of Maxima. The function bug_report()
provides bug reporting information.
```

(%i1) `K[1]:g(t,y)`

(%o1) $g(t,y)$

(%i2) `A:taylor(g(t+h[t],y+h[y]),[h[t],h[y]],0,4)`

(%o2)
$$g(t,y)+\left(\left(\frac{d}{d\,h_t}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_t+\left(\frac{d}{d\,h_y}\,g(t,h_y+y)\Big|_{h_y=0}\right)h_y\right)+$$
$$\frac{\left(\frac{d^2}{d\,h_t^2}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_t^2+2\left(\frac{d^2}{d\,h_t\,d\,h_y}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_y\,h_t+\left(\frac{d^2}{d\,h_y^2}\,g(t,h_y+y)\Big|_{h_y=0}\right)h_y^2}{2}+$$
$$\frac{\left(\frac{d^3}{d\,h_t^3}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_t^3+3\left(\frac{d^3}{d\,h_t^2\,d\,h_y}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_y\,h_t^2+3\left(\frac{d^3}{d\,h_t\,d\,h_y^2}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_y^2\,h_t+\left(\right.}{6}$$
$$\frac{\left(\frac{d^4}{d\,h_t^4}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_t^4+4\left(\frac{d^4}{d\,h_t^3\,d\,h_y}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_y\,h_t^3+6\left(\frac{d^4}{d\,h_t^2\,d\,h_y^2}\,g(h_t+t,h_y+y)\Big|_{h_t=0}\right)h_y^2\,h_t^2+4}{24}$$

(%i3) `h[t]=mu[21]*h`

(%o3) $h_t=\mu_{21}\,h$

(%i4) `h[y]=mu[21]*h*K[1]`

(%o4) $h_y=\mu_{21}\,h\,g(t,y)$

(%i5) `K[2]:A,%o3,%o4,ratexpand`

(%o5)
$$\frac{\mu_{21}^4\,h^4\left(\frac{d^4}{d\,(\mu_{21}^4\,h^4)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\Big|_{\mu_{21}h=0}\right)}{24}+$$
$$\frac{\mu_{21}^4\,h^4\,g(t,y)\left(\frac{d^4}{d\,(\mu_{21}^3\,h^3)\,d\,(\mu_{21}\,h\,g(t,y))}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\Big|_{\mu_{21}h=0}\right)}{6}+$$
$$\frac{\mu_{21}^3\,h^3\left(\frac{d^3}{d\,(\mu_{21}^3\,h^3)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\Big|_{\mu_{21}h=0}\right)}{6}+$$
$$\frac{\mu_{21}^4\,h^4\,g(t,y)^2\left(\frac{d^4}{d\,(\mu_{21}^2\,h^2)\,d\,(\mu_{21}^2\,h^2\,g(t,y)^2)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\Big|_{\mu_{21}h=0}\right)}{4}+$$
$$\frac{\mu_{21}^3\,h^3\,g(t,y)\left(\frac{d^3}{d\,(\mu_{21}^2\,h^2)\,d\,(\mu_{21}\,h\,g(t,y))}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\Big|_{\mu_{21}h=0}\right)}{2}+$$
$$\frac{\mu_{21}^2\,h^2\left(\frac{d^2}{d\,(\mu_{21}^2\,h^2)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\Big|_{\mu_{21}h=0}\right)}{2}+$$
$$\frac{\mu_{21}^4\,h^4\,g(t,y)^3\left(\frac{d^4}{d\,(\mu_{21}\,h)\,d\,(\mu_{21}^3\,h^3\,g(t,y)^3)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\Big|_{\mu_{21}h=0}\right)}{6}+$$

$$\frac{\mu_{21}^3\,h^3\,g(t,y)^2\left(\left.\frac{d^3}{d\left(\mu_{21}\,h\right)d\left(\mu_{21}^2\,h^2\,g(t,y)^2\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}h=0}\right)}{2}+\mu_{21}^2\,h^2\,g(t,$$
$$y)\left(\left.\frac{d^2}{d\left(\mu_{21}\,h\right)d\left(\mu_{21}\,h\,g(t,y)\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}h=0}\right)+\mu_{21}\,h\left(\left.\frac{d}{d\left(\mu_{21}\,h\right)}\,g(t+\mu_{21}\,h,\right.\right.$$
$$\left.\left.y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}h=0}\right)+\frac{\mu_{21}^4\,h^4\,g(t,y)^4\left(\left.\frac{d^4}{d\left(\mu_{21}^4\,h^4\,g(t,y)^4\right)}\,g(t,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}hg(t,y)=0}\right)}{24}+$$
$$\frac{\mu_{21}^3\,h^3\,g(t,y)^3\left(\left.\frac{d^3}{d\left(\mu_{21}^3\,h^3\,g(t,y)^3\right)}\,g(t,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}hg(t,y)=0}\right)}{6}+$$
$$\frac{\mu_{21}^2\,h^2\,g(t,y)^2\left(\left.\frac{d^2}{d\left(\mu_{21}^2\,h^2\,g(t,y)^2\right)}\,g(t,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}hg(t,y)=0}\right)}{2}+\mu_{21}\,h\,g(t,$$
$$y)\left(\left.\frac{d}{d\left(\mu_{21}\,h\,g(t,y)\right)}\,g(t,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}hg(t,y)=0}\right)+g(t,y)$$

```
(%i6) h[t]=(mu[31]+mu[32])*h
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(%o6) $h_t=\left(\mu_{32}+\mu_{31}\right)h$

```
(%i7) taylor(h*(mu[31]*K[1]+mu[32]*K[2]),h,0,4)
```

(%o7) $\left(\mu_{32}+\mu_{31}\right)g(t,y)\,h+\left(\mu_{21}\,\mu_{32}\left(\left.\frac{d}{d\left(\mu_{21}\,h\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}h=0}\right)+\right.$
$\left.\mu_{21}\,\mu_{32}\,g(t,y)\left(\left.\frac{d}{d\left(\mu_{21}\,h\,g(t,y)\right)}\,g(t,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}hg(t,y)=0}\right)\right)h^2+$
$\frac{\left(\mu_{21}^2\,\mu_{32}\left(\left.\frac{d^2}{d\left(\mu_{21}^2\,h^2\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}h=0}\right)+2\,\mu_{21}^2\,\mu_{32}\,g(t,y)\left(\frac{d^2}{d\left(\mu_{21}\,h\right)d\left(\mu_{21}\,h\,g(t,y)\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\right.\right.}{2}$
$\left.\left.\left(\mu_{21}^3\,\mu_{32}\left(\left.\frac{d^3}{d\left(\mu_{21}^3\,h^3\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}h=0}\right)+3\,\mu_{21}^3\,\mu_{32}\,g(t,y)\left(\frac{d^3}{d\left(\mu_{21}^2\,h^2\right)d\left(\mu_{21}\,h\,g(t,y)\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\right.\right.\right.$

```
(%i8) h[y]=taytorat(%o7)
```

(%o8) $h_y=$
$\left(\mu_{21}^3\,\mu_{32}\left(\left.\frac{d^3}{d\left(\mu_{21}^3\,h^3\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\,h\,g(t,y))\right|_{\mu_{21}h=0}\right)+3\,\mu_{21}^3\,\mu_{32}\,g(t,y)\left(\frac{d^3}{d\left(\mu_{21}^2\,h^2\right)d\left(\mu_{21}\,h\,g(t,y)\right)}\,g(t+\mu_{21}\,h,y+\mu_{21}\right.\right.$

```
(%i9) A,%o6,%o8

Maxima encountered a Lisp error:

 Error in PROGN [or a callee]: Caught fatal error [memory may be damaged]

Automatically continuing.
To reenable the Lisp debugger set *debugger-hook* to nil.
(%i10)
```