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> restart,with(grtensor);
libname := "/Users/peter/maple/gitlab/GRTensorIII/lib",
"/Library/Frameworks/Maple.framework/Versions/2017/lib"
"GRTensor III v2.0.2 + Debug"
"Copyright 2017, Peter Musgrave, Denis Pollney, Kayll Lake"
"Latest version is at http://github.com/grtensor/grtensor"
"For help ?grtensor"

[Asym, KillingCoords, PetrovReport, Sym, autoAlias, difftool, grDalias, grF_strToDef, gralter,
 grapply, grarray, grcalc, grcalc1, grcalcalter, grcalcd, grclear, grcomponent, grconstraint,
 grdata, grdebug, grdef, grdisplay, grdump, greqn2set, grinit, grload, grload_maplet,
 grmap, grmetric, grnewmetric, grnormalize, groptions, grsaveg, grtestinput, grtransform,
 grundef, hypersurf, join, kdelta, makeg, nrotate, nptetrad, qload, spacetime]

grOptionqloadPath := "/Users/peter/maple/gitlab/GRTensorIII/kayll/metrics"
grOptionMetricPath := "/Users/peter/maple/gitlab/grtensor/metrics" (1)

[Asym, KillingCoords, PetrovReport, Sym, autoAlias, difftool, grDalias, grF_strToDef, gralter,
 grapply, grarray, grcalc, grcalc1, grcalcalter, grcalcd, grclear, grcomponent, grconstraint,
 grdata, grdebug, grdef, grdisplay, grdump, greqn2set, grinit, grload, grload_maplet,
 grmap, grmetric, grnewmetric, grnormalize, groptions, grsaveg, grtestinput, grtransform,
 grundef, hypersurf, join, kdelta, makeg, nrotate, nptetrad, qload, spacetime]

> qload(gowdybasis);
Default spacetime = gowdybasis
For the gowdybasis spacetime:
Coordinates
 $x^{(up)}$ 
 $x^a = \begin{bmatrix} t & \theta & x_1 & x_2 \end{bmatrix}$ 
Basis inner product
 $\eta(bup, bup)$ 
 $\eta^{(a)(b)} = \begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ 
Basis (contravariant components)
 $eI^{(up)}$ 
 $eI^a = \begin{bmatrix} \frac{\gamma(t, \theta)}{4} & t^1 | 4 & 0 & 0 & 0 \end{bmatrix}$ 
 $e2^{(up)}$ 

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$$e2^a = \begin{bmatrix} & \frac{\gamma(t, \theta)}{4} & t^{1/4} & 0 & 0 \\ 0 & e^{\frac{\gamma(t, \theta)}{4}} & t^{1/4} & 0 & 0 \end{bmatrix}$$

e3(up)

$$e3^a = \begin{bmatrix} 0 & 0 & -Q(t, \theta) \sqrt{\frac{e^{P(t, \theta)}}{t}} & \sqrt{\frac{e^{P(t, \theta)}}{t}} \end{bmatrix}$$

e4(up)

$$e4^a = \begin{bmatrix} 0 & 0 & \frac{1}{\sqrt{t e^{P(t, \theta)}}} & 0 \end{bmatrix}$$

For the gowdybasis spacetime:

constraints

$$\text{constraint} = \left[\frac{\partial}{\partial t} \gamma(t, \theta) = -t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - t \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 \right. \quad (2)$$

$$- t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 - t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2, \frac{\partial}{\partial \theta} \gamma(t, \theta) = -2 t \left(\frac{\partial}{\partial \theta} P(t,$$

$$\theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) - 2 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right), \frac{\partial^2}{\partial t^2} P(t, \theta) = \frac{\partial^2}{\partial \theta^2}$$

$$P(t, \theta) - \frac{\frac{\partial}{\partial t} P(t, \theta)}{t} + e^{2P(t, \theta)} \left(\left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \right), \frac{\partial^2}{\partial t^2} Q(t, \theta)$$

$$= \frac{\partial^2}{\partial \theta^2} Q(t, \theta) - \frac{\frac{\partial}{\partial t} Q(t, \theta)}{t} - 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} P(t,$$

$$\theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)$$

> *grcalc(R(bdn, bdn, pdn));*

Created a definition for R(bdn, bdn, pdn)

Created a definition for e(bdn, dn, pdn)

Created definition for rot(bdn, bup, bdn)

Calculated e(bup, up) for gowdybasis (0.019000 sec.)

Calculated g(up, up) for gowdybasis (0.020000 sec.)

Calculated detg for gowdybasis (0.000000 sec.)

Calculated g(dn, dn) for gowdybasis (0.021000 sec.)

Calculated e(bdn, dn) for gowdybasis (0.000000 sec.)

Calculated e(bdn, dn, pdn) for gowdybasis (0.002000 sec.)

Calculated lambda(bdn, bdn, bdn) for gowdybasis (0.004000 sec.)

Calculated rot(bdn, bdn, bdn) for gowdybasis (0.001000 sec.)

Calculated rot(bdn, bup, bdn) for gowdybasis (0.001000 sec.)

Calculated R(bdn,bdn,bdn,bdn) for gowdybasis (0.012000 sec.)
 Calculated R(bdn,bdn) for gowdybasis (0.003000 sec.)
 Calculated R(bdn,bdn,pdn) for gowdybasis (0.065000 sec.)
 CPU Time = 0.154

(3)

> *grdisplay*(_);

For the gowdybasis spacetime:

$$R(bdn,bdn,pdn)$$

$$\begin{aligned}
 R_{(C1)(C1)\dots(t)} &= \frac{1}{8 t^{3/2}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(-8 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \right. \right. \\
 &\quad - 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 8 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \\
 &\quad \left. \left. - 2 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \right. \\
 &\quad - 8 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 - \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \\
 &\quad \left. \left. \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t^3} \gamma(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} \gamma(t, \theta) \right) t^2 - 2 t \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 \right. \right. \\
 &\quad \left. \left. - \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right)^2 t - \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t + \frac{\partial}{\partial t} \gamma(t, \theta) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 R_{(C2)(C1)\dots(t)} &= -\frac{1}{8 t^{3/2}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(8 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \right. \right. \\
 &\quad + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \\
 &\quad \left. \left. t^2 (e^{P(t, \theta)})^2 + 2 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \right. \right. \\
 &\quad \left. \left. + 4 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial t^2} \right. \right. \\
 &\quad \left. \left. P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \\
 &\quad \left. \left. \gamma(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial t \partial \theta} \gamma(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \right) \right)
 \end{aligned}$$

$$R_{(C1)(C2)\dots(t)} = -\frac{1}{8 t^{3/2}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(8 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \right. \right.$$

$$\begin{aligned}
& \theta) \Big) t^2 (\mathrm{e}^{P(t, \theta)})^2 + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 \\
& + 4 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 + 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 \\
& + 2 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \\
& \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial t \partial \theta} \gamma(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right)
\end{aligned}$$

$$\begin{aligned}
R_{(\gamma_2), (\gamma_2), \dots, t} &= -\frac{1}{8 t^{3/2}} \left(\left(\mathrm{e}^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(8 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 \right. \right. \\
& + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 + 8 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 \\
& + 2 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \\
& + 8 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 - \left(\frac{\partial^2}{\partial \theta^2} \right. \\
& \left. \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t^3} \gamma(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} \gamma(t, \theta) \right) t^2 + 2 t \left(\frac{\partial}{\partial \theta} \right. \\
& \left. P(t, \theta) \right)^2 + \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right)^2 t + 3 \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t - \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right)
\end{aligned}$$

$$\begin{aligned}
R_{(\gamma_3), (\gamma_3), \dots, t} &= \frac{1}{4 t^{3/2}} \left(\left(\mathrm{e}^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 \right. \right. \\
& + \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 - 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 \\
& - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 + 4 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2
\end{aligned}$$

$$\begin{aligned}
& \theta) \left(\left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \right. \\
& + t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 + \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \gamma(t, \theta) \left. \right) t^2 - \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} P(t, \theta) \right) t^2 \\
& - \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t - 3 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + \frac{\partial}{\partial t} \\
& \left. P(t, \theta) \right) \Bigg)
\end{aligned}$$

$$\begin{aligned}
R_{(4), (3), \dots, t} &= - \frac{1}{4 \sqrt{t} (t e^{P(t, \theta)})^{5/2} \left(\frac{e^{P(t, \theta)}}{t} \right)^{3/2}} \left(\left(e^{P(t, \theta)} \right)^5 \left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(\right. \right. \\
& - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 - 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \\
& + 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \\
& \left. \left. \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \\
& \gamma(t, \theta) \left. \right) t^2 - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t^2 - 6 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \\
& - \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial t \partial \theta} \right. \\
& Q(t, \theta) \left. \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} Q(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} Q(t, \theta) \right) t^2 - 4 \left(\frac{\partial}{\partial t} \right. \\
& Q(t, \theta) \left. \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t - \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& P(t, \theta) \left. \right) t + \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) t - 3 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) t + \frac{\partial}{\partial t} Q(t, \theta) \Bigg) \\
R_{(3), (4), \dots, t} &= - \frac{1}{4 \sqrt{t} (t e^{P(t, \theta)})^{5/2} \left(\frac{e^{P(t, \theta)}}{t} \right)^{3/2}} \left(\left(e^{P(t, \theta)} \right)^5 \left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(\right. \right.
\end{aligned}$$

$$\begin{aligned}
& -4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 - 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \\
& + 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \\
& \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. \gamma(t, \theta) \right) t^2 - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t^2 - 6 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \\
& - \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial t \partial \theta} \right. \\
& \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} Q(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} Q(t, \theta) \right) t^2 - 4 \left(\frac{\partial}{\partial t} \right. \\
& \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t - \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& \left. P(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) t - 3 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) t + \frac{\partial}{\partial t} Q(t, \theta) \right)
\end{aligned}$$

$$\begin{aligned}
R_{(\gamma^{(4)})^* (\gamma^{(4)})^* \dots \gamma^*} &= -\frac{1}{4 t^{3/2}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \right. \right. \\
& + \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) \\
& \left. \left. t^2 (e^{P(t, \theta)})^2 - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 4 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \right. \\
& \left. \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \right. \\
& + t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 + \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. \gamma(t, \theta) \right) t^2 - \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} P(t, \theta) \right) \\
& \left. \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t - 3 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + \frac{\partial}{\partial t} \right. \\
& \left. \left. P(t, \theta) \right) \right)
\end{aligned}$$

$$\begin{aligned}
R_{(\gamma(2), \gamma(1))} &= -\frac{1}{8\sqrt{t}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \right. \right. \\
&\quad \left. \left. \theta \right) \left(e^{P(t, \theta)} \right)^2 t + 8t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \right. \\
&\quad \left. + 4t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 4t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \right. \\
&\quad \left. + 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + 4t \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \right. \\
&\quad \left. + 4t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right)^2 \right. \\
&\quad \left. + 2 \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \right)
\end{aligned}$$

$$R_{(\gamma(1), \gamma(2), \dots, \gamma(\theta))} = -\frac{1}{8\sqrt{t}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(e^{P(t, \theta)} \right)^2 t + 8 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) + 4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + 4 t \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \right)$$

$$P(t, \theta) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + 4t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right)^2$$

$$+ 2 \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \Bigg)$$

$$\begin{aligned} R_{(\gamma_2), (\gamma_2), \dots; \theta} &= -\frac{1}{8\sqrt{t}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 (e^{P(t, \theta)})^2 t \right. \right. \\ &\quad + 8t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) + 8t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \right. \\ &\quad \left. \left. Q(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t \right. \\ &\quad \left. - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t + 8t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) \right. \\ &\quad \left. + 2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial^3}{\partial \theta^3} \gamma(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial t \partial \theta} \gamma(t, \theta) \right) \right) \\ &\quad \Bigg) \end{aligned}$$

$$\begin{aligned} R_{(\gamma_3), (\gamma_3), \dots; \theta} &= \frac{1}{4\sqrt{t}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \left(\left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 (e^{P(t, \theta)})^2 t \right. \right. \\ &\quad - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 (e^{P(t, \theta)})^2 t + 4t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} \right. \\ &\quad \left. P(t, \theta) \right) - 4t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) - 4t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \\ &\quad \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 4t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^3}{\partial \theta^3} P(t, \theta) \right) t \\ &\quad \left. - 2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} P(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) - 2 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \right) \Bigg) \end{aligned}$$

$$R_{(\gamma_4), (\gamma_3), \dots; \theta} = -\frac{1}{4 (t e^{P(t, \theta)})^{5/2} \left(\frac{e^{P(t, \theta)}}{t} \right)^{3/2}} \left((e^{P(t, \theta)})^5 \left(e^{\frac{\gamma(t, \theta)}{4}} \right)^2 \sqrt{t} \left(\right. \right.$$

$$\begin{aligned}
& - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right)^2 \left(e^{P(t, \theta)} \right)^2 t + 4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} \right. \\
& \left. P(t, \theta) \right) - 4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) - 4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right) \\
& \left(\frac{\partial^2}{\partial \theta^2} \mathcal{Q}(t, \theta) \right) + 4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} \mathcal{Q}(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \\
& \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^3}{\partial \theta^3} P(t, \theta) \right) t \\
& - 2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} P(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) - 2 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \Big)
\end{aligned}$$

> grcalc(R(bdn, bdn, cbdn));
 Created a definition for R(bdn, bdn, cbdn)
 Created definition for rot(bup, bdn, bdn)
 Calculated rot(bup, bdn, bdn) for gowdybasis (0.002000 sec.)
 Calculated R(bdn, bdn, cbdn) for gowdybasis (0.027000 sec.)

CPU Time = 0.042 (5)

> grdisplay(_):

For the gowdybasis spacetime:

$R(bdn, bdn, cbdn)$

$$\begin{aligned}
R_{(1)(1)(1)(1)} &= -\frac{1}{8 t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + 8 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + 2 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right) t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + 8 \left(\frac{\partial^2}{\partial t^2} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right)^2 - \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 8 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} \gamma(t, \theta) \right) t^2 + t \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right)^2 + \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right)^2 t + 2 t \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 + \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) \right) \right)
\end{aligned}$$

$$\theta) \Big) t + 2 \left(\frac{\partial^2}{\partial t \partial \theta} \gamma(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \Big) \Big)$$

$$R_{(C2), (C2), \dots, (I)} = -\frac{1}{8t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(2(e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 8 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 8 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + 2 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 + 8 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 - \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t^3} \gamma(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} \gamma(t, \theta) \right) t^2 + 2 t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 + t \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right)^2 + \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right)^2 t + 3 \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t - \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) \right)$$

$$R_{(C3), (C3), \dots, (I)} = \frac{1}{4t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(\left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 8 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 6 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) - 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 3 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 - \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t^2 \right)$$

$$\theta) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} P(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t - 3 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t + \frac{\partial}{\partial t} P(t, \theta) \right) \right)$$

$$R_{(4)(3)\dots;(1)} =$$

$$\begin{aligned}
& - \frac{1}{4 t^{1/4} (t e^{P(t, \theta)})^{5/2} \left(\frac{e^{P(t, \theta)}}{t} \right)^{3/2}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 (e^{P(t, \theta)})^5 \left(2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} \right. \right. \right. \\
& Q(t, \theta) \left. \left. \right)^3 t^2 - 2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 t^2 - 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \\
& P(t, \theta) \left. \left. \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 + 2 \left(\frac{\partial}{\partial \theta} Q(t, \right. \\
& \theta) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \\
& \theta) \left. \left. \right) t^2 - 6 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t^2 \\
& + 4 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial \theta \partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \\
& - \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 - 6 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} \right. \\
& Q(t, \theta) \left. \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \\
& \gamma(t, \theta) \left. \left. \right) t - 6 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t \\
& + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} Q(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} Q(t, \theta) \right) t^2 - 3 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} Q(t, \right. \right. \\
& \theta) \left. \left. \right) t + \frac{\partial}{\partial t} Q(t, \theta) \right)
\end{aligned}$$

$$R_{(3)(4)\dots(1)} =$$

$$-\frac{1}{4 t^{1/4} \left(t e^{P(t, \theta)}\right)^{5/2} \left(\frac{e^{P(t, \theta)}}{t}\right)^{3/2}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}}\right)^3 \left(e^{P(t, \theta)}\right)^5 \left(2 \left(e^{P(t, \theta)}\right)^2 \left(\frac{\partial}{\partial t}\right.\right.$$

$$\begin{aligned}
& \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right)^3 t^2 - 2 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right)^2 t^2 - 2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 - 4 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 + 2 \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& \left. P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& \left. P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 4 \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& \left. P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 - 6 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t^2 \\
& + 4 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right) t^2 + 4 \left(\frac{\partial^2}{\partial \theta \partial \theta} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \\
& - \left(\frac{\partial^2}{\partial t^2} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 - 6 \left(\frac{\partial^2}{\partial t^2} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} \right. \\
& \left. \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^2}{\partial \theta^2} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. \gamma(t, \theta) \right) t - 6 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + 2 \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t \\
& + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} \mathcal{Q}(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} \mathcal{Q}(t, \theta) \right) t^2 - 3 \left(\frac{\partial^2}{\partial t^2} \mathcal{Q}(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} \mathcal{Q}(t, \theta) \right) t + \frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \Bigg)
\end{aligned}$$

$$\begin{aligned}
R_{(4)(4)(4)(4)(1)} &= -\frac{1}{4 t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(\left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 \right. \right. \\
& + 8 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 - 4 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& \left. \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 \\
& - 4 \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + 6 \left(\frac{\partial^2}{\partial t^2} \mathcal{Q}(t, \theta) \right) \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) \\
& \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 - 2 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right) t^2 \left(\frac{\partial^2}{\partial \theta^2} \mathcal{Q}(t, \theta) \right) - 4 \left(\frac{\partial^2}{\partial t \partial \theta} \mathcal{Q}(t, \theta) \right) \\
& \left(\frac{\partial}{\partial \theta} \mathcal{Q}(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + 3 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} \mathcal{Q}(t, \theta) \right)^2
\end{aligned}$$

$$-t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 - \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right)$$

$$\theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial^3}{\partial t \partial \theta^2} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^3}{\partial t^3} P(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t - 3 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t + \frac{\partial}{\partial t} P(t, \theta) \Bigg)$$

$$R_{(1,1), (1,1), \dots, (2,2)} = -\frac{1}{8t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(8 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 + 2t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) - t^2 \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + t^2 \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + 8 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 - 2t^2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} \gamma(t, \theta) \right) + 2t^2 \left(\frac{\partial^3}{\partial \theta^3} \gamma(t, \theta) \right) + 2t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial t \partial \theta} \gamma(t, \theta) \right) t + \frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \Bigg)$$

$$R_{(2,2), (1,1), \dots, (2,2)} = -\frac{1}{8t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(\left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + 8 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + 4 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 t^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 + \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \right)$$

$$\begin{aligned}
& \theta) \Big) t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \\
& + t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 + t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 + 4 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \right. \\
& \theta) \Big) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 4 t^2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 \\
& + t \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right)^2 + \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right)^2 t + t \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 + 2 \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t + \frac{\partial}{\partial t} \\
& \left. \gamma(t, \theta) \right)
\end{aligned}$$

$$\begin{aligned}
R_{(1), (2), \dots, (2)} &= -\frac{1}{8 t^{5/4}} \left(\left(\mathrm{e}^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(\left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 \right. \right. \\
& + 8 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} \right. \\
& \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \right. \\
& \theta) \Big) t^2 (\mathrm{e}^{P(t, \theta)})^2 + 4 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \right. \\
& \theta) \Big) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 + \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \right. \\
& \theta) \Big) t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \\
& + t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 + t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 + 4 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \right. \\
& \theta) \Big) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 4 t^2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 \\
& + t \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right)^2 + \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right)^2 t + t \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 + 2 \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t + \frac{\partial}{\partial t} \\
& \left. \gamma(t, \theta) \right)
\end{aligned}$$

$$R_{(2), (2), \dots, (2)} = -\frac{1}{8 t^{5/4}} \left(\left(\mathrm{e}^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 \right. \right.$$

$$\begin{aligned}
& \theta) \Big) t^2 (\mathrm{e}^{P(t, \theta)})^2 + 8 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \\
& + 2 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + 8 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \\
& \theta) \Big) t^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t^2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t^2 + 2 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) + 8 \left(\frac{\partial}{\partial \theta} \right. \\
& \left. P(t, \theta) \right) t^2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) + t^2 \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) - t^2 \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \\
& \theta) \Big) \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + 2 t^2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} \gamma(t, \theta) \right) - 2 t^2 \left(\frac{\partial^3}{\partial \theta^3} \gamma(t, \theta) \right) + 2 t \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. P(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial t \partial \theta} \gamma(t, \theta) \right) t + \frac{\partial}{\partial \theta} \\
& \gamma(t, \theta) \Big)
\end{aligned}$$

$$\begin{aligned}
R_{(3), (3), \dots, (2)} &= \frac{1}{4 t^{1/4}} \left(\mathrm{e}^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(4 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \right. \\
& + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 (\mathrm{e}^{P(t, \theta)})^2 t + 4 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) - 8 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \\
& \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 (\mathrm{e}^{P(t, \theta)})^2 t + 4 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \\
& + 2 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) - 6 t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \right. \\
& \left. Q(t, \theta) \right) + 2 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \\
& \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) t + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^3}{\partial \theta^3} P(t, \theta) \right) t - 2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} P(t, \theta) \right) t \\
& - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) - 2 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \Big)
\end{aligned}$$

$$R_{(4), (3), \dots, (2)} =$$

$$\begin{aligned}
& - \frac{1}{4(t e^{P(t, \theta)})^{5/2} \left(\frac{e^{P(t, \theta)}}{t} \right)^{3/2}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 (e^{P(t, \theta)})^5 t^{3/4} \left(2(e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} \right. \right. \right. \\
& Q(t, \theta) \left. \left. \left. \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t - 2(e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^3 t - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \right. \right. \\
& P(t, \theta) \left. \left. \left. \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + 4 \left(\frac{\partial}{\partial \theta} \right. \right. \right. \\
& Q(t, \theta) \left. \left. \left. \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t + 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t \right. \\
& - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + 6 \left(\frac{\partial}{\partial \theta} \right. \right. \right. \\
& Q(t, \theta) \left. \left. \left. \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t + 6 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \right. \right. \\
& \left. \left. \left. \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) t - 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \right. \\
& P(t, \theta) \left. \left. \left. \right) t + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \right. \\
& - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + 2 \left(\frac{\partial^3}{\partial \theta^3} Q(t, \theta) \right) \\
& \left. \left. \left. \right) t - 2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} Q(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \right)
\end{aligned}$$

$$R_{(3)(4)\dots(2)} =$$

$$\begin{aligned}
& - \frac{1}{4(t e^{P(t, \theta)})^{5/2} \left(\frac{e^{P(t, \theta)}}{t} \right)^{3/2}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 (e^{P(t, \theta)})^5 t^{3/4} \right) \\
& \quad \left(2(e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t - 2(e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^3 t - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \right. \\
& \quad \left. \left. P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + 4 \left(\frac{\partial}{\partial \theta} \right. \right. \\
& \quad \left. \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t + 2 \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t \right. \\
& \quad \left. - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + 6 \left(\frac{\partial}{\partial \theta} \right. \right. \\
& \quad \left. \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^3 t \right)
\end{aligned}$$

$$\begin{aligned}
& \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t + 6 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \\
& \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) t - 4 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. P(t, \theta) \right) t + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \\
& - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + 2 \left(\frac{\partial^3}{\partial \theta^3} Q(t, \theta) \right) \\
& \left. \left(t - 2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} Q(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \right) \right) \\
R_{(4)} &= -\frac{1}{4 t^{1/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \right. \right. \\
& + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(e^{P(t, \theta)} \right)^2 t + 4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& Q(t, \theta) \left. \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) - 8 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \\
& \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(e^{P(t, \theta)} \right)^2 t + 4 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t \partial \theta} Q(t, \theta) \right) \\
& + 2 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) - 6 t \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \right. \\
& Q(t, \theta) \left. \right) + 2 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \\
& \left. \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^3}{\partial \theta^3} P(t, \theta) \right) t - 2 \left(\frac{\partial^3}{\partial t^2 \partial \theta} P(t, \theta) \right) \right. \\
& \left. \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) - 2 \left(\frac{\partial^2}{\partial t \partial \theta} P(t, \theta) \right) \right) \\
R_{(3)} &= -\frac{1}{8 t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) \right. \right. \\
& \left. \left(e^{P(t, \theta)} \right)^2 - 6 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \right) t^2 \\
& + 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 \left(e^{P(t, \theta)} \right)^2 - 2 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \\
& \left. \left(e^{P(t, \theta)} \right)^2 - 6 \left(e^{P(t, \theta)} \right)^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \right) t^2
\end{aligned}$$

$$\begin{aligned}
& \theta) \Big) t^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 2t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t^2 \left(\frac{\partial}{\partial t} \right. \\
& \left. P(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (\mathrm{e}^{P(t, \theta)})^2 - \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t \left(\frac{\partial}{\partial \theta} \right. \\
& \left. \gamma(t, \theta) \right) - 2t (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 + 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right)^3 t^2 - \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \\
& - 2t^2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right. \\
& \left. \theta) \right) t - \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t - \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) \\
& - 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) \Big) \Big)
\end{aligned}$$

$R_{(4), (1), (3)}$

$$\begin{aligned}
& = \frac{1}{8t^{1/4} (t \mathrm{e}^{P(t, \theta)})^{3/2} \sqrt{\frac{\mathrm{e}^{P(t, \theta)}}{t}}} \left(\left(\frac{\gamma(t, \theta)}{4} \right)^3 (\mathrm{e}^{P(t, \theta)})^3 \left(4 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} \right. \right. \right. \\
& \left. \left. \left. Q(t, \theta) \right)^3 t^2 - 4 (\mathrm{e}^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 t^2 + 6 \left(\frac{\partial}{\partial t} Q(t, \right. \right. \\
& \left. \left. \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 - 6 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial t} \right. \right. \\
& \left. \left. Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t^2 + \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t^2 - 2 \left(\frac{\partial}{\partial t} Q(t, \right. \right. \\
& \left. \left. \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \\
& \left. \left. P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t \\
& - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} Q(t, \right. \right. \\
& \left. \left. \theta) \right) \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \Big) \Big)
\end{aligned}$$

$$\begin{aligned}
R_{(3)(2)} &= \frac{1}{8t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(2(e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \right. \right. \\
&\quad - 6 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \\
&\quad + 4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t^2 \\
&\quad \left. \left. + 2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^3 t^2 + \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t^2 \right. \right. \\
&\quad - 2 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + \frac{\partial}{\partial \theta} \gamma(t, \theta) \Big) \Big)
\end{aligned}$$

$$\begin{aligned}
R_{(4)(2)(3)} &= \frac{1}{8(t e^{P(t, \theta)})^{3/2} \sqrt{\frac{e^{P(t, \theta)}}{t}}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 t^{3/4} (e^{P(t, \theta)})^3 \left(4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} \right. \right. \right. \\
&\quad \left. \left. \left. Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t - 4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^3 t + 6 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \right. \\
&\quad \left. \left. P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t - 6 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} \right. \right. \\
&\quad \left. \left. \gamma(t, \theta) \right) t + \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t \right. \\
&\quad + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial \theta^2} \right. \right. \\
&\quad \left. \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \\
&\quad \left. \left. Q(t, \theta) \right) - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \right) \Big) \Big)
\end{aligned}$$

$$\begin{aligned}
R_{(1), (3), \dots, (3)} &= -\frac{1}{8t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) \right. \right. \\
&\quad \left. \left. t^2 (e^{P(t, \theta)})^2 - 6 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \right. \right. \\
&\quad + 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right. \\
&\quad \left. \theta) \right) t^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 2 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t^2 \left(\frac{\partial}{\partial t} \right. \\
&\quad \left. P(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t \left(\frac{\partial}{\partial \theta} \right. \\
&\quad \left. \gamma(t, \theta) \right) - 2 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 + 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right)^3 t^2 - \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
&\quad \left. P(t, \theta) \right) t^2 + \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \\
&\quad - 2 t^2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) + \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t + \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right. \\
&\quad \left. \theta) \right) t - \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t - \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) \\
&\quad \left. \left. - 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) \right) \right) \\
R_{(2), (3), \dots, (3)} &= \frac{1}{8t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \right. \right. \\
&\quad \left. \left. - 6 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 \right. \right. \\
&\quad + 4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right. \\
&\quad \left. \theta) \right) t^2 (e^{P(t, \theta)})^2 + 2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 t^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^3 t^2 + \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t^2 \right. \\
&\quad \left. - 2 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t^2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \right. \right. \\
&\quad \left. \left. P(t, \theta) \right)^3 t^2 \right)
\end{aligned}$$

$$P(t, \theta) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 - \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + \frac{\partial}{\partial \theta} \gamma(t, \theta) \Bigg)$$

$R_{(1), (4), \dots, (3)}$

$$\begin{aligned} &= \frac{1}{8 t^{1/4} (t e^{P(t, \theta)})^{3/2} \sqrt{\frac{e^{P(t, \theta)}}{t}}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 (e^{P(t, \theta)})^3 \left(4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} \right. \right. \right. \\ &\quad \left. \left. \left. Q(t, \theta) \right)^3 t^2 - 4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 t^2 + 6 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 - \left(\frac{\partial}{\partial t} \right. \right. \\ &\quad \left. \left. Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t^2 + \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t^2 - 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \\ &\quad \left. \left. P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t \right. \\ &\quad \left. - 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t + 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \right) \Bigg) \end{aligned}$$

$R_{(2), (4), \dots, (3)}$

$$\begin{aligned} &= \frac{1}{8 (t e^{P(t, \theta)})^{3/2} \sqrt{\frac{e^{P(t, \theta)}}{t}}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 t^{3/4} (e^{P(t, \theta)})^3 \left(4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} \right. \right. \right. \\ &\quad \left. \left. \left. Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) t - 4 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^3 t + 6 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \right. \right. \\ &\quad \left. \left. P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t - 6 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 t - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} \right. \right. \\ &\quad \left. \left. \gamma(t, \theta) \right) t + \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t \right) \Bigg) \end{aligned}$$

$$\begin{aligned}
& + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial \theta^2} \right. \\
& \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t + 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) + \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \\
& \left. Q(t, \theta) \right) - \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) \Big)
\end{aligned}$$

$$\begin{aligned}
R_{(3), (1), \dots, (4)} &= - \frac{1}{8 t^{1/4} (t e^{P(t, \theta)})^{3/2} \sqrt{\frac{e^{P(t, \theta)}}{t}}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 (e^{P(t, \theta)})^3 \left(2 \left(\frac{\partial}{\partial t} \right. \right. \right. \\
& \left. \left. \left. Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right)^2 t^2 - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \right. \\
& + \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t^2 - 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t^2 \right. \\
& \left. \left. \left. + 2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \right. \right. \right. \\
& \left. \left. \left. P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 - \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t \right. \\
& + 4 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t - 4 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t + \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) t + 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \Big)
\end{aligned}$$

$$\begin{aligned}
R_{(4), (1), \dots, (4)} &= \frac{1}{8 t^{5/4}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 \left(2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t^2 \right. \right. \\
& - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 - 2 \left(\frac{\partial^2}{\partial t^2} Q(t, \theta) \right) \\
& \left. \left. \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 (e^{P(t, \theta)})^2 + 2 (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) t^2 \left(\frac{\partial^2}{\partial \theta^2} Q(t, \theta) \right) \right. \right. \\
& + 2 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right)^2 - 2 t (e^{P(t, \theta)})^2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right)^2 - 2 \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \\
& \left. \left. \left. \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right)^3 t^2 - \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 \right. \right. \right. \\
& + \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 - 2 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t^2 + 2 t^2 \left(\frac{\partial^2}{\partial \theta^2} \right)
\end{aligned}$$

$$P(t, \theta) \Big) \left(\frac{\partial}{\partial t} P(t, \theta) \right) - \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) t \left(\frac{\partial}{\partial \theta} \gamma(t, \theta) \right) + \left(\frac{\partial}{\partial t} P(t, \theta) \right) \left(\frac{\partial}{\partial t} \gamma(t, \theta) \right) t - \left(\frac{\partial^2}{\partial t^2} \gamma(t, \theta) \right) t + \left(\frac{\partial^2}{\partial \theta^2} \gamma(t, \theta) \right) t - 2 \left(\frac{\partial^2}{\partial t^2} P(t, \theta) \right) t + 2 \left(\frac{\partial^2}{\partial \theta^2} P(t, \theta) \right) t + \frac{\partial}{\partial t} \gamma(t, \theta) - 2 \left(\frac{\partial}{\partial t} P(t, \theta) \right) \Big) \Bigg)$$

$$R_{(3), (2), \dots; (4)} = - \frac{1}{8 \left(t e^{P(t, \theta)} \right)^{3/2} \sqrt{\frac{e^{P(t, \theta)}}{t}}} \left(\left(e^{\frac{\gamma(t, \theta)}{4}} \right)^3 t^{3/4} \left(e^{P(t, \theta)} \right)^3 \left(2 \left(\frac{\partial}{\partial t} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right) \left(\frac{\partial}{\partial t} P(t, \theta) \right) t - 2 \left(\frac{\partial}{\partial \theta} Q(t, \theta) \right) \left(\frac{\partial}{\partial \theta} P(t, \theta) \right)^2 \right. \right. \right.$$



(6)

> *qload(npschw);*

