

Pensieve header: Fixing many many signs for SnG.

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SetDirectory["C:\\drorbn\\AcademicPensieve\\2016-03"];
<< SnG.m

SetSigns[0]

tmhts[u_] :=
  (u // tm[1, 2, 1] // hts[4, 1]) - (u // hts[4, 1] // hts[4, 2] // tm[1, 2, 1]);
tmhts@UU[a[f2[b1, b2, b3], 1, 4]]
UU[δβ[b1 ∈8 f2(0,1,0)[b1, b1, b3] - b1 ∈3 ∈9 f2(0,1,0)[b1, b1, b3]]]

ε8 = ε9 ε3;

tmhts[u_] :=
  (u // tm[1, 2, 1] // hts[4, 1]) - (u // hts[4, 1] // hts[4, 2] // tm[1, 2, 1]);
tmhts@UU[a[f6[b1, b2, b3], 2, 4]]
UU[δβ[b1 ∈3 ∈9 f6(1,0,0)[b1, b1, b3] - b1 ∈5 ∈9 f6(1,0,0)[b1, b1, b3]]]

ε3 = ε5;

hmhts[u_] :=
  (u // hm[1, 2, 1] // hts[1, 4]) - (u // hts[2, 4] // hts[1, 4] // hm[1, 2, 1]);
hmhts@UU[ca[f24[b4, b5], 2, 4, 1]]
UU[δβ[-b4 ∈4 ∈9 f24[b4, b5] + b4 ∈9 ∈10 f24[b4, b5]]]

ε4 = ε10;

hmhts[u_] :=
  (u // hm[2, 1, 1] // hts[1, 4]) - (u // hts[1, 4] // hts[2, 4] // hm[2, 1, 1]);
hmhts@UU[δaa[f43[b4, b5], 4, 1, 5, 2]]
UU[δβ[b4 b5 ∈2 ∈9 f43[b4, b5] + b4 b5 ∈16 f43[b4, b5]]]

ε16 = -ε2 ε9;

tbAS[u_, v_] := tb[0][u, v] + tb[0][v, u];
tbAS@@{UU[a[f2[b0, b1], 0, 1]], UU[a[g2[b0, b2], 0, 3]]}
UU[ca[-b0 ∈0 ∈19 g2[b0, b2] f2(1,0)[b0, b1] + b0 ∈0 ∈20 g2[b0, b2] f2(1,0)[b0, b1], 3, 0, 1] +
  ca[-b0 ∈0 ∈19 f2[b0, b1] g2(1,0)[b0, b2] + b0 ∈0 ∈20 f2[b0, b1] g2(1,0)[b0, b2], 1, 0, 3] +
  δaa[ε19 g2[b0, b2] f2(1,0)[b0, b1] - ε20 g2[b0, b2] f2(1,0)[b0, b1] +
    ε19 f2[b0, b1] g2(1,0)[b0, b2] - ε20 f2[b0, b1] g2(1,0)[b0, b2], 0, 1, 0, 3]]

ε20 = ε19;

tbAS[u_, v_] := tb[0][u, v] + tb[0][v, u];
tbAS@@{UU[a[f2[b0, b1], 0, 1]], UU[a[g6[b0, b2], 2, 3]]}
UU[ca[-b0 ∈0 ∈19 f2[b0, b1] g6(1,0)[b0, b2] + b0 ∈0 ∈22 f2[b0, b1] g6(1,0)[b0, b2], 1, 2, 3] +
  δaa[ε19 f2[b0, b1] g6(1,0)[b0, b2] - ε22 f2[b0, b1] g6(1,0)[b0, b2], 0, 1, 2, 3]]

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$\epsilon_{22} = \epsilon_{19};$

$\text{hbJacobi}[u_, v_, w_] :=$

$\text{hb}[0][u, \text{hb}[0][v, w]] + \text{hb}[0][v, \text{hb}[0][w, u]] + \text{hb}[0][w, \text{hb}[0][u, v]];$

$\text{hbJacobi} @@ \{\text{UU}[a[f_2[b_1, b_2], 1, 0]], \text{UU}[a[g_2[b_3, b_4], 3, 0]], \text{UU}[\delta a[h_3[b_5, b_6], 5, 0]]\}$

$\text{UU}[\delta a[b_1 b_5 \epsilon_{23} \epsilon_{25} f_2[b_1, b_2] g_2[b_3, b_4] h_3[b_5, b_6] - b_1 b_5 \epsilon_{25}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_3[b_5, b_6],$
 $3, 0] + \delta a[-b_3 b_5 \epsilon_{23} \epsilon_{25} f_2[b_1, b_2] g_2[b_3, b_4] h_3[b_5, b_6] +$
 $b_3 b_5 \epsilon_{25}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_3[b_5, b_6], 1, 0]]]$

$\epsilon_{25} = \epsilon_{23};$

$\text{hbJacobi}[u_, v_, w_] :=$

$\text{hb}[0][u, \text{hb}[0][v, w]] + \text{hb}[0][v, \text{hb}[0][w, u]] + \text{hb}[0][w, \text{hb}[0][u, v]];$

$\text{hbJacobi} @@ \{\text{UU}[a[f_2[b_1, b_2], 1, 0]], \text{UU}[a[g_2[b_3, b_4], 3, 0]], \text{UU}[c[h_{11}[b_5, b_6], 0]]\}$

$\text{UU}[\delta a[-b_1 \epsilon_{23} \epsilon_{24} f_2[b_1, b_2] g_2[b_3, b_4] h_{11}[b_5, b_6] + b_1 \epsilon_0 \epsilon_{24}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_{11}[b_5, b_6],$
 $3, 0] + \delta a[b_3 \epsilon_{23} \epsilon_{24} f_2[b_1, b_2] g_2[b_3, b_4] h_{11}[b_5, b_6] -$
 $b_3 \epsilon_0 \epsilon_{24}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_{11}[b_5, b_6], 1, 0]]]$

$\epsilon_{23} = \epsilon_{24} \epsilon_0;$

$\text{hbJacobi}[u_, v_, w_] :=$

$\text{hb}[0][u, \text{hb}[0][v, w]] + \text{hb}[0][v, \text{hb}[0][w, u]] + \text{hb}[0][w, \text{hb}[0][u, v]];$

$\text{hbJacobi} @@ \{\text{UU}[a[f_2[b_1, b_2], 1, 0]], \text{UU}[a[g_2[b_3, b_4], 3, 0]],$

$\text{UU}[ca[h_{13}[b_5, b_6], 0, 5, 0]]\}$

$\text{UU}[ca[b_1 b_5 \epsilon_0 \epsilon_{24} \epsilon_{27} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] -$
 $b_1 b_5 \epsilon_{27}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 0, 3, 0] +$
 $ca[-b_3 b_5 \epsilon_0 \epsilon_{24} \epsilon_{27} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] +$
 $b_3 b_5 \epsilon_{27}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 0, 1, 0] +$
 $\delta a[-b_1 b_5 \epsilon_2 \epsilon_{26} \epsilon_{27} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] +$
 $b_1 b_5 \epsilon_2 \epsilon_{26} \epsilon_{29} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 3, 0] +$
 $\delta a[b_3 b_5 \epsilon_2 \epsilon_{26} \epsilon_{27} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] -$
 $b_3 b_5 \epsilon_2 \epsilon_{26} \epsilon_{29} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 1, 0] + \delta aa[$
 $b_1 \epsilon_0 \epsilon_{24} \epsilon_{26} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] + b_1 \epsilon_0 \epsilon_{26}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] +$
 $b_1 \epsilon_{26} \epsilon_{27} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] - 2 b_1 \epsilon_{26} \epsilon_{28} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] -$
 $b_1 \epsilon_{26} \epsilon_{29} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 3, 0, 5, 0] + \delta aa[$
 $-b_3 \epsilon_0 \epsilon_{24} \epsilon_{26} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] - b_3 \epsilon_0 \epsilon_{26}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] -$
 $b_3 \epsilon_{26} \epsilon_{27} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] + 2 b_3 \epsilon_{26} \epsilon_{28} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] +$
 $b_3 \epsilon_{26} \epsilon_{29} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 1, 0, 5, 0]]]$

$\epsilon_{27} = \epsilon_{24} \epsilon_0;$

$\epsilon_{29} = \epsilon_{24} \epsilon_0;$

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hbJacobi[u_, v_, w_] :=
  hb[0][u, hb[0][v, w]] + hb[0][v, hb[0][w, u]] + hb[0][w, hb[0][u, v]];
hbJacobi @@ {UU[δaa[f28[b1, b2], 2, 0, 2, 1]],
  UU[a[g6[b3, b4], 4, 0]], UU[a[h6[b5, b6], 6, 0]]}
UU[ca[-b22 b4 ε0 ε1 ε24 ε28 f28[b1, b2] g6[b3, b4] h6[b5, b6] +
  b22 b4 ε0 ε1 ε26 ε28 f28[b1, b2] g6[b3, b4] h6[b5, b6], 0, 6, 1] +
  ca[b22 b6 ε0 ε1 ε24 ε28 f28[b1, b2] g6[b3, b4] h6[b5, b6] -
  b22 b6 ε0 ε1 ε26 ε28 f28[b1, b2] g6[b3, b4] h6[b5, b6], 0, 4, 1] +
  δaa[b2 b4 ε0 ε24 ε28 f28[b1, b2] g6[b3, b4] h6[b5, b6] -
  b2 b4 ε1 ε26 ε28 f28[b1, b2] g6[b3, b4] h6[b5, b6], 2, 0, 6, 1] +
  δaa[-b2 b6 ε0 ε24 ε28 f28[b1, b2] g6[b3, b4] h6[b5, b6] +
  b2 b6 ε1 ε26 ε28 f28[b1, b2] g6[b3, b4] h6[b5, b6], 2, 0, 4, 1]]]

ε26 = ε24;

ε0 = ε1;

hbJacobi[u_, v_, w_] :=
  hb[0][u, hb[0][v, w]] + hb[0][v, hb[0][w, u]] + hb[0][w, hb[0][u, v]];
hbJacobi @@ {UU[a[f2[b1, b2], 1, 0]], UU[a[g2[b3, b4], 3, 0]],
  UU[ca[h13[b5, b6], 0, 5, 0]]}
UU[δaa[
  2 b1 ε1 ε242 f2[b1, b2] g2[b3, b4] h13[b5, b6] - 2 b1 ε24 ε28 f2[b1, b2] g2[b3, b4] h13[b5, b6],
  3, 0, 5, 0] + δaa[-2 b3 ε1 ε242 f2[b1, b2] g2[b3, b4] h13[b5, b6] +
  2 b3 ε24 ε28 f2[b1, b2] g2[b3, b4] h13[b5, b6], 1, 0, 5, 0]]]

ε28 = ε1 ε24;

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thhJacobi[u_, v_, w_] := Plus[
  -thb[0, 0][u, hb[0][v, w]] + hb[0][thb[0, 0][u, v], w] + thb[0, 0][thb[0, 0][u, v],
    w] + hb[0][v, thb[0, 0][u, w]] - thb[0, 0][thb[0, 0][u, w], v]
];
thhJacobi@@{UU[a[f2[b0, b1], 0, 1]], UU[a[g2[b2, b3], 2, 0]], UU[a[h2[b4, b5], 4, 0]]}
UU[
a[b0 b2 e1 e24 e35 f2[b0, b1] g2[b2, b3] h2[b4, b5] - b0 b2 e35^2 f2[b0, b1] g2[b2, b3] h2[b4, b5],
  4, 1] + a[-b0 b4 e1 e24 e35 f2[b0, b1] g2[b2, b3] h2[b4, b5] +
  b0 b4 e35^2 f2[b0, b1] g2[b2, b3] h2[b4, b5], 2, 1] +
ca[-b2 e1 e24 e36 f2[b0, b1] g2[b2, b3] h2[b4, b5] + b2 e35 e36 f2[b0, b1]
  g2[b2, b3] h2[b4, b5] + b0 b2 e1 e31 e35 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] -
  b0 b2 e1 e31 e47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 0, 4, 1] +
ca[b2 e1 e31 e35 f2[b0, b1] g2[b2, b3] h2[b4, b5] - b2 e35 e36 f2[b0, b1] g2[b2, b3] h2[b4, b5] -
  b0 b2 e1 e31 e46 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] +
  b0 b2 e1 e31 e47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 1, 4, 0] +
ca[-b4 e1 e31 e35 f2[b0, b1] g2[b2, b3] h2[b4, b5] + b4 e35 e36 f2[b0, b1]
  g2[b2, b3] h2[b4, b5] + b0 b4 e1 e31 e46 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] -
  b0 b4 e1 e31 e47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 1, 2, 0] +
ca[b4 e1 e24 e36 f2[b0, b1] g2[b2, b3] h2[b4, b5] - b4 e35 e36 f2[b0, b1] g2[b2, b3] h2[b4, b5] -
  b0 b4 e1 e31 e35 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] +
  b0 b4 e1 e31 e47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 0, 2, 1] +
da[-b0 b2 e1 e24 e34 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] + b0 b2 e34 e35 g2[b2, b3]
  h2[b4, b5] f2^(1,0)[b0, b1] - b0 b2 e32 e45 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] +
  b0 b2 e33 e45 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 4, 1] +
da[b0 b4 e1 e24 e34 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] - b0 b4 e34 e35 g2[b2, b3]
  h2[b4, b5] f2^(1,0)[b0, b1] + b0 b4 e32 e45 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] -
  b0 b4 e33 e45 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 2, 1] +
daa[-b2 e31 e35 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] +
  b2 e31 e47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 0, 0, 4, 1] +
daa[b4 e31 e35 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] -
  b4 e31 e47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 0, 0, 2, 1]]

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e47 = e35;

e35 = e1 e24;

e36 = e1 e31;

e46 = e1 e24;

e33 = e32;

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thhJacobi[u_, v_, w_] := Plus[
  -thb[0, 0][u, hb[0][v, w]] + hb[0][thb[0, 0][u, v], w] + thb[0, 0][thb[0, 0][u, v],
    w] + hb[0][v, thb[0, 0][u, w]] - thb[0, 0][thb[0, 0][u, w], v]
];
thhJacobi@@
{UU[δaa[f23[b0, b1], 0, 2, 0, 2]], UU[a[g6[b2, b3], 3, 0]], UU[a[h6[b4, b5], 5, 0]]}
UU[δa[b0^2 b3 ε1^2 ε2 ε24 ε24 f23[b0, b1] g6[b2, b3] h6[b4, b5] -
  b0^2 b3 ε1 ε2 ε24 ε45 f23[b0, b1] g6[b2, b3] h6[b4, b5], 5, 2] +
  δa[-b0^2 b5 ε1^2 ε2 ε24 f23[b0, b1] g6[b2, b3] h6[b4, b5] +
  b0^2 b5 ε1 ε2 ε24 ε45 f23[b0, b1] g6[b2, b3] h6[b4, b5], 3, 2] +
  δaa[b0 b3 ε1^2 ε24 f23[b0, b1] g6[b2, b3] h6[b4, b5] - b0 b3 ε48^2 f23[b0, b1] g6[b2, b3] h6[b4, b5],
  0, 2, 5, 2] + δaa[-b0 b5 ε1^2 ε24 f23[b0, b1] g6[b2, b3] h6[b4, b5] +
  b0 b5 ε48^2 f23[b0, b1] g6[b2, b3] h6[b4, b5], 0, 2, 3, 2]]
ε45 = ε1 ε24;
thhJacobi[u_, v_, w_] := Plus[
  -thb[0, 0][u, hb[0][v, w]] + hb[0][thb[0, 0][u, v], w] + thb[0, 0][thb[0, 0][u, v],
    w] + hb[0][v, thb[0, 0][u, w]] - thb[0, 0][thb[0, 0][u, w], v]
];
thhJacobi@@{UU[a[f2[b0, b1], 0, 1]], UU[a[g2[b2, b3], 2, 0]], UU[c[h11[b4, b5], 0]]}
UU[
  δa[b0 ε1 ε24 ε37 f2[b0, b1] g2[b2, b3] h11[b4, b5] - b0 ε24 ε38 f2[b0, b1] g2[b2, b3] h11[b4, b5],
  2, 1] + δa[-b2 ε1 ε24 ε37 f2[b0, b1] g2[b2, b3] h11[b4, b5] +
  b2 ε24 ε38 f2[b0, b1] g2[b2, b3] h11[b4, b5], 0, 1]]
ε38 = ε1 ε37;

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thhJacobi[u_, v_, w_] := Plus[
  -thb[0, 0][u, hb[0][v, w]] + hb[0][thb[0, 0][u, v], w] + thb[0, 0][thb[0, 0][u, v],
    w] + hb[0][v, thb[0, 0][u, w]] - thb[0, 0][thb[0, 0][u, w], v]
];
thhJacobi@@
{UU[a[f2[b0, b1], 0, 1]], UU[a[g2[b2, b3], 2, 0]], UU[ca[h13[b4, b5], 0, 4, 0]]}
UU[ca[b0 b4 e1^2 e24 e39 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
  b0 b4 e1 e24 e40 f2[b0, b1] g2[b2, b3] h13[b4, b5] - b0 b4 e1 e24 e42 f2[b0, b1]
  g2[b2, b3] h13[b4, b5] - b0 b4 e1 e24 e43 f2[b0, b1] g2[b2, b3] h13[b4, b5], 0, 2, 1] +
ca[-b0 b4 e1^2 e24 e39 f2[b0, b1] g2[b2, b3] h13[b4, b5] - b0 b4 e1 e24 e40 f2[b0, b1]
  g2[b2, b3] h13[b4, b5] + b0 b4 e1 e24 e42 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
  b0 b4 e1 e24 e43 f2[b0, b1] g2[b2, b3] h13[b4, b5], 1, 2, 0] +
ca[b2 b4 e1^2 e24 e39 f2[b0, b1] g2[b2, b3] h13[b4, b5] + b2 b4 e1 e24 e40 f2[b0, b1]
  g2[b2, b3] h13[b4, b5] - b2 b4 e1 e24 e42 f2[b0, b1] g2[b2, b3] h13[b4, b5] -
  b2 b4 e1 e24 e43 f2[b0, b1] g2[b2, b3] h13[b4, b5], 1, 0, 0] +
ca[-b2 b4 e1^2 e24 e39 f2[b0, b1] g2[b2, b3] h13[b4, b5] - b2 b4 e1 e24 e40 f2[b0, b1]
  g2[b2, b3] h13[b4, b5] + b2 b4 e1 e24 e42 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
  b2 b4 e1 e24 e43 f2[b0, b1] g2[b2, b3] h13[b4, b5], 0, 0, 1] +
deltaa[b0 b4 e1 e24 e41 f2[b0, b1] g2[b2, b3] h13[b4, b5] -
  b0 b4 e24 e44 f2[b0, b1] g2[b2, b3] h13[b4, b5], 2, 1] +
deltaa[-b2 b4 e1 e24 e41 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
  b2 b4 e24 e44 f2[b0, b1] g2[b2, b3] h13[b4, b5], 0, 1] +
deltaaa[-b2 e1 e24 e39 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
  b2 e24 e42 f2[b0, b1] g2[b2, b3] h13[b4, b5], 0, 0, 4, 1] + deltaaa[
  b0 e1 e24 e39 f2[b0, b1] g2[b2, b3] h13[b4, b5] + b0 e24 e40 f2[b0, b1] g2[b2, b3] h13[b4, b5] -
  b0 e24 e42 f2[b0, b1] g2[b2, b3] h13[b4, b5] - b0 e24 e43 f2[b0, b1] g2[b2, b3] h13[b4, b5],
  2, 0, 4, 1] + deltaaa[-b4 e24 e40 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
  b4 e24 e43 f2[b0, b1] g2[b2, b3] h13[b4, b5], 0, 0, 2, 1]
]

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e43 = e40;

e42 = e1 e39;

e44 = e1 e41;

```

thhJacobi[u_, v_, w_] := Plus[
  -thb[0, 0][u, hb[0][v, w]] + hb[0][thb[0, 0][u, v], w] + thb[0, 0][thb[0, 0][u, v],
    w] + hb[0][v, thb[0, 0][u, w]] - thb[0, 0][thb[0, 0][u, w], v]
];

```

```
thhJacobi@@
```

```
{UU[a[f2[b0, b1], 0, 1]], UU[a[g2[b2, b3], 2, 0]], UU[δaa[h21[b4, b5], 4, 0, 4, 0]]}
```

```

UU[δa[-b0 b2 b4 ε1^2 ε2 ε24 ε37 f2[b0, b1] g2[b2, b3] h21[b4, b5] +
  b0 b2 b4 ε1^2 ε24 ε41 f2[b0, b1] g2[b2, b3] h21[b4, b5], 4, 1] +
  δa[b0 b4^2 ε1^2 ε2 ε24 ε37 f2[b0, b1] g2[b2, b3] h21[b4, b5] -
  b0 b4^2 ε1^2 ε24 ε41 f2[b0, b1] g2[b2, b3] h21[b4, b5], 2, 1] +
  δaa[b2 b4 ε1^2 ε24 ε39 f2[b0, b1] g2[b2, b3] h21[b4, b5] -
  b2 b4 ε1 ε24 ε40 f2[b0, b1] g2[b2, b3] h21[b4, b5], 0, 0, 4, 1] +
  δaa[-b4^2 ε1^2 ε24 ε39 f2[b0, b1] g2[b2, b3] h21[b4, b5] +
  b4^2 ε1 ε24 ε40 f2[b0, b1] g2[b2, b3] h21[b4, b5], 0, 0, 2, 1]]

```

```
ε40 = ε1 ε39;
```

```
ε41 = ε2 ε37;
```

```
tthJacobi[u_, v_, w_] := Plus[
```

```

  -thb[0, 0][tb[0][u, v], w] + tb[0][thb[0, 0][u, w], v] - thb[0, 0][v,
    thb[0, 0][u, w]] + tb[0][u, thb[0, 0][v, w]] + thb[0, 0][u, thb[0, 0][v, w]]
];

```

```
tthJacobi@@{UU[a[f2[b0, b1], 0, 1]], UU[a[g2[b0, b2], 0, 3]], UU[a[h2[b3, b4], 3, 0]]}
```

```

UU[ca[-b3 ε1^2 ε19 ε24 f2[b0, b1] g2[b0, b2] h2[b3, b4] +
  b3 ε1 ε21 ε24 f2[b0, b1] g2[b0, b2] h2[b3, b4], 1, 0, 3] +
  ca[b0 ε1 ε21 ε24 f2[b0, b1] g2[b0, b2] h2[b3, b4] - b0 ε1^2 ε31 ε39 f2[b0, b1]
  g2[b0, b2] h2[b3, b4] + b0^2 ε1^2 ε19 ε24 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] -
  b0^2 ε1^2 ε31 ε39 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 1, 3, 3] +
  ca[-b0 ε1 ε21 ε24 f2[b0, b1] g2[b0, b2] h2[b3, b4] + b0 ε1^2 ε31 ε39 f2[b0, b1]
  g2[b0, b2] h2[b3, b4] - b0^2 ε1^2 ε19 ε24 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] +
  b0^2 ε1^2 ε31 ε39 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 3, 3, 1] + ca[
  b3 ε1^2 ε19 ε24 f2[b0, b1] g2[b0, b2] h2[b3, b4] - b3 ε1 ε21 ε24 f2[b0, b1] g2[b0, b2] h2[b3, b4] -
  b0 b3 ε1^2 ε19 ε24 g2[b0, b2] h2[b3, b4] f2^(1,0)[b0, b1] + b0 b3 ε1^2 ε31 ε39 g2[b0, b2]
  h2[b3, b4] f2^(1,0)[b0, b1] + b0 b3 ε1^2 ε19 ε24 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] -
  b0 b3 ε1^2 ε31 ε39 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 3, 0, 1] +
  δaa[-b0 ε1 ε31 ε39 g2[b0, b2] h2[b3, b4] f2^(1,0)[b0, b1] + b0 ε19 ε48 g2[b0, b2]
  h2[b3, b4] f2^(1,0)[b0, b1] + b0 ε1 ε31 ε39 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] -
  b0 ε19 ε48 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 0, 1, 3, 3] +
  δaa[b3 ε1 ε19 ε24 g2[b0, b2] h2[b3, b4] f2^(1,0)[b0, b1] - b3 ε19 ε48 g2[b0, b2]
  h2[b3, b4] f2^(1,0)[b0, b1] - b3 ε1 ε19 ε24 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] +
  b3 ε19 ε48 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 0, 1, 0, 3]]

```

```
ε21 = ε1 ε19;
```

$$\epsilon_{31} = \epsilon_{24} \epsilon_{19} / \epsilon_{39};$$

$$\epsilon_{48} = \epsilon_1 \epsilon_{24};$$

$$\text{dbAS}[\underline{u}, \underline{v}] := \text{db}[0][\underline{u}, \underline{v}] + \text{db}[0][\underline{v}, \underline{u}];$$

$$\text{dbAS}@\{\text{UU}[\text{a}[\text{f}_2[\mathbf{b}_0, \mathbf{b}_1, \mathbf{b}_2], 0, 0]], \text{UU}[\text{a}[\text{g}_2[\mathbf{b}_0, \mathbf{b}_3, \mathbf{b}_4], 0, 0]]\}$$

$$\begin{aligned} & \text{UU} \left[c \left[-2 b_0 \epsilon_1^2 \epsilon_{10} \epsilon_{19} f_2[b_0, b_1, b_2] g_2[b_0, b_3, b_4] + 2 b_0 \epsilon_1^2 \epsilon_5 \epsilon_{24} f_2[b_0, b_1, b_2] g_2[b_0, b_3, b_4] - \right. \right. \\ & \quad b_0^2 \epsilon_1^2 \epsilon_{10} \epsilon_{19} g_2[b_0, b_3, b_4] f_2^{(1,0,0)}[b_0, b_1, b_2] + \\ & \quad b_0^2 \epsilon_1^2 \epsilon_5 \epsilon_{24} g_2[b_0, b_3, b_4] f_2^{(1,0,0)}[b_0, b_1, b_2] - b_0^2 \epsilon_1^2 \epsilon_{10} \epsilon_{19} f_2[b_0, b_1, b_2] \\ & \quad \left. g_2^{(1,0,0)}[b_0, b_3, b_4] + b_0^2 \epsilon_1^2 \epsilon_5 \epsilon_{24} f_2[b_0, b_1, b_2] g_2^{(1,0,0)}[b_0, b_3, b_4], 0 \right] + \\ & \quad \delta a \left[2 \epsilon_1 \epsilon_{10} \epsilon_{19} f_2[b_0, b_1, b_2] g_2[b_0, b_3, b_4] - 2 \epsilon_1 \epsilon_5 \epsilon_{24} f_2[b_0, b_1, b_2] g_2[b_0, b_3, b_4] + \right. \\ & \quad b_0 \epsilon_1 \epsilon_{10} \epsilon_{19} g_2[b_0, b_3, b_4] f_2^{(1,0,0)}[b_0, b_1, b_2] - \\ & \quad b_0 \epsilon_1 \epsilon_5 \epsilon_{24} g_2[b_0, b_3, b_4] f_2^{(1,0,0)}[b_0, b_1, b_2] + b_0 \epsilon_1 \epsilon_{10} \epsilon_{19} f_2[b_0, b_1, b_2] \\ & \quad \left. g_2^{(1,0,0)}[b_0, b_3, b_4] - b_0 \epsilon_1 \epsilon_5 \epsilon_{24} f_2[b_0, b_1, b_2] g_2^{(1,0,0)}[b_0, b_3, b_4], 0, 0 \right] \end{aligned}$$

$$\epsilon_{19} = \epsilon_5 \epsilon_{24} / \epsilon_{10};$$

$$\text{dbJacobi}[\underline{u}, \underline{v}, \underline{w}] :=$$

$$\text{db}[0][\underline{u}, \text{db}[0][\underline{v}, \underline{w}]] + \text{db}[0][\underline{v}, \text{db}[0][\underline{w}, \underline{u}]] + \text{db}[0][\underline{w}, \text{db}[0][\underline{u}, \underline{v}]];$$

$$\text{dbJacobi}@\{\text{UU}[\text{a}[\text{f}_2[\mathbf{b}_0, \mathbf{b}_1, \mathbf{b}_2], 0, 0]], \text{UU}[\text{a}[\text{g}_4[\mathbf{b}_0, \mathbf{b}_3, \mathbf{b}_4], 0, 3]],$$

$$\text{UU}[\text{a}[\text{h}_8[\mathbf{b}_0, \mathbf{b}_5, \mathbf{b}_6], 5, 0]]\}$$

$$\begin{aligned} & \text{UU} \left[c \left[-b_0 b_5 \epsilon_1^3 \epsilon_5 \epsilon_{24}^2 f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8[b_0, b_5, b_6] + \right. \right. \\ & \quad \frac{1}{\epsilon_{39}} b_0 b_5 \epsilon_1^3 \epsilon_5 \epsilon_{24}^2 \epsilon_{37} f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8[b_0, b_5, b_6] - \\ & \quad b_0^2 b_5 \epsilon_1^2 \epsilon_{32} \epsilon_{37} g_4[b_0, b_3, b_4] h_8[b_0, b_5, b_6] f_2^{(1,0,0)}[b_0, b_1, b_2] + \frac{1}{\epsilon_{10} \epsilon_{39}} \\ & \quad b_0^2 b_5 \epsilon_1^2 \epsilon_2 \epsilon_5 \epsilon_{24}^2 \epsilon_{37} g_4[b_0, b_3, b_4] h_8[b_0, b_5, b_6] f_2^{(1,0,0)}[b_0, b_1, b_2] - \\ & \quad b_0^2 b_5 \epsilon_1^3 \epsilon_5 \epsilon_{24}^2 f_2[b_0, b_1, b_2] h_8[b_0, b_5, b_6] g_4^{(1,0,0)}[b_0, b_3, b_4] + \\ & \quad b_0^2 b_5 \epsilon_1^2 \epsilon_{24} \epsilon_{32} f_2[b_0, b_1, b_2] h_8[b_0, b_5, b_6] g_4^{(1,0,0)}[b_0, b_3, b_4] - \\ & \quad b_0^2 b_5 \epsilon_1^3 \epsilon_5 \epsilon_{24}^2 f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6] + \\ & \quad b_0^2 b_5 \epsilon_1^2 \epsilon_{24} \epsilon_{32} f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6] + \frac{1}{\epsilon_{10}} \\ & \quad b_0^2 b_5 \epsilon_1^2 \epsilon_2 \epsilon_5 \epsilon_{24} \epsilon_{37} f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6] - \frac{1}{\epsilon_{10} \epsilon_{39}} \\ & \quad \left. b_0^2 b_5 \epsilon_1^2 \epsilon_2 \epsilon_5 \epsilon_{24}^2 \epsilon_{37} f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6], 3 \right] + \\ & \quad \text{ca} \left[-\frac{1}{\epsilon_{10}} 2 b_0^2 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6] + \right. \\ & \quad \frac{1}{\epsilon_{10} \epsilon_{39}} b_0^2 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6] + \frac{1}{\epsilon_{10}} \\ & \quad \left. b_0^2 \epsilon_1^2 \epsilon_5 \epsilon_{24} \epsilon_{39} f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6], 0, 5, 3 \right] + \\ & \quad \text{ca} \left[\frac{1}{\epsilon_{10}} 2 b_0 b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6] - \right. \\ & \quad \frac{1}{\epsilon_{10} \epsilon_{39}} b_0 b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6] - \frac{1}{\epsilon_{10}} \\ & \quad \left. b_0 b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24} \epsilon_{39} f_2[b_0, b_1, b_2] g_4[b_0, b_3, b_4] h_8^{(1,0,0)}[b_0, b_5, b_6], 0, 0, 3 \right] + \end{aligned}$$

$$\begin{aligned}
 & ca \left[-\frac{1}{\epsilon_{10}} b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] + \right. \\
 & \quad \left. \frac{b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24}^3 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6]}{\epsilon_{10} \epsilon_{39}} - \frac{1}{\epsilon_{10}} \right. \\
 & \quad \left. b_0 b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6] + \frac{1}{\epsilon_{10}} \right. \\
 & \quad \left. b_0 b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24} \epsilon_{39} f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6], 3, 0, 0 \right] + \\
 & \delta a \left[b_0 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] - \frac{1}{\epsilon_{39}} \right. \\
 & \quad \left. b_0 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 \epsilon_{37} f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] + \right. \\
 & \quad \left. b_0^2 \epsilon_1 \epsilon_{34} \epsilon_{37} g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] f_2^{(1,0,0)} [b_0, b_1, b_2] - \frac{1}{\epsilon_{39}} \right. \\
 & \quad \left. b_0^2 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 \epsilon_{37} g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] f_2^{(1,0,0)} [b_0, b_1, b_2] + \right. \\
 & \quad \left. b_0^2 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2 [b_0, b_1, b_2] h_8 [b_0, b_5, b_6] g_4^{(1,0,0)} [b_0, b_3, b_4] - \right. \\
 & \quad \left. b_0^2 \epsilon_1 \epsilon_{24} \epsilon_{34} f_2 [b_0, b_1, b_2] h_8 [b_0, b_5, b_6] g_4^{(1,0,0)} [b_0, b_3, b_4], 5, 3 \right] + \\
 & \delta a \left[b_0 b_5 \epsilon_1 \epsilon_{32} \epsilon_{37} g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] f_2^{(1,0,0)} [b_0, b_1, b_2] - \right. \\
 & \quad \left. b_0 b_5 \epsilon_1 \epsilon_{34} \epsilon_{37} g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] f_2^{(1,0,0)} [b_0, b_1, b_2] + \frac{1}{\epsilon_{39}} \right. \\
 & \quad \left. b_0 b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 \epsilon_{37} g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] f_2^{(1,0,0)} [b_0, b_1, b_2] - \frac{1}{\epsilon_{10} \epsilon_{39}} \right. \\
 & \quad \left. b_0 b_5 \epsilon_1 \epsilon_2 \epsilon_5 \epsilon_{24}^2 \epsilon_{37} g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] f_2^{(1,0,0)} [b_0, b_1, b_2] + \right. \\
 & \quad \left. b_0 b_5 \epsilon_1^2 \epsilon_5 \epsilon_{24}^2 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6] - \right. \\
 & \quad \left. b_0 b_5 \epsilon_1 \epsilon_{24} \epsilon_{34} f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6] - \frac{1}{\epsilon_{10}} \right. \\
 & \quad \left. b_0 b_5 \epsilon_1 \epsilon_2 \epsilon_5 \epsilon_{24} \epsilon_{37} f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6] + \frac{1}{\epsilon_{10} \epsilon_{39}} \right. \\
 & \quad \left. b_0 b_5 \epsilon_1 \epsilon_2 \epsilon_5 \epsilon_{24}^2 \epsilon_{37} f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6], 0, 3 \right] + \\
 & \delta aa \left[-\frac{1}{\epsilon_{10}} b_5 \epsilon_1 \epsilon_5 \epsilon_{24}^2 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6] + \frac{1}{\epsilon_{10} \epsilon_{39}} \right. \\
 & \quad \left. b_5 \epsilon_1 \epsilon_5 \epsilon_{24}^3 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6], 0, 0, 0, 3 \right] + \\
 & \delta aa \left[\frac{\epsilon_1 \epsilon_5 \epsilon_{24}^2 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6]}{\epsilon_{10}} - \right. \\
 & \quad \left. \frac{\epsilon_1 \epsilon_5 \epsilon_{24}^3 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6]}{\epsilon_{10} \epsilon_{39}} + \frac{1}{\epsilon_{10}} \right. \\
 & \quad \left. 2 b_0 \epsilon_1 \epsilon_5 \epsilon_{24}^2 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6] - \frac{1}{\epsilon_{10} \epsilon_{39}} \right. \\
 & \quad \left. b_0 \epsilon_1 \epsilon_5 \epsilon_{24}^3 f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6] - \frac{1}{\epsilon_{10}} \right. \\
 & \quad \left. b_0 \epsilon_1 \epsilon_5 \epsilon_{24} \epsilon_{39} f_2 [b_0, b_1, b_2] g_4 [b_0, b_3, b_4] h_8^{(1,0,0)} [b_0, b_5, b_6], 0, 0, 5, 3 \right]
 \end{aligned}$$

$\epsilon_{39} = \epsilon_{24} ;$

$\epsilon_{37} = \epsilon_{24} ;$

$\epsilon_{32} = \epsilon_2 \epsilon_5 \epsilon_{24} / \epsilon_{10} ;$

$\epsilon_2 = \epsilon_1 \epsilon_{10} ;$

$$\epsilon_{34} = \epsilon_1 \epsilon_5 \epsilon_{24};$$

```
dbdm[u_, v_] := Plus[
  db[1][u, dσ[2, -2][v]] // dm[2, -2, 2],
  -db[1][u, dσ[2, -2][v]] // dm[-2, 2, 2],
  -db[2][u, dσ[1, -1][v]] // dm[1, -1, 1],
  db[2][u, dσ[1, -1][v]] // dm[-1, 1, 1]
];
dbdm@{UU[a[f2[b1, b2, b3], 1, 1]], UU[a[g4[b1, b2, b4], 1, 2]]}
```

$$\text{UU} \left[c \left[\frac{b_1^2 \epsilon_1^2 \epsilon_5 \epsilon_{24} g_4 [b_1, b_2, b_4] f_2^{(0,1,0)} [b_1, b_2, b_3] - b_1^2 \epsilon_1 \epsilon_5 \epsilon_{11} \epsilon_{24} g_4 [b_1, b_2, b_4] f_2^{(0,1,0)} [b_1, b_2, b_3]}{\epsilon_{10}}, 2 \right] + \delta a \left[-b_1 \epsilon_1 \epsilon_5 \epsilon_{24} g_4 [b_1, b_2, b_4] f_2^{(0,1,0)} [b_1, b_2, b_3] + \frac{b_1 \epsilon_5 \epsilon_{12} \epsilon_{24} g_4 [b_1, b_2, b_4] f_2^{(0,1,0)} [b_1, b_2, b_3]}{\epsilon_{10}}, 1, 2 \right] \right]$$

$$\epsilon_{24} = \epsilon_1 \epsilon_{10};$$

$$\epsilon_{12} = \epsilon_1 \epsilon_{10};$$

$$\epsilon_{11} = \epsilon_1 \epsilon_{10};$$

```
dbdm[u_, v_] := Plus[
  db[1][u, dσ[2, -2][v]] // dm[2, -2, 2],
  -db[1][u, dσ[2, -2][v]] // dm[-2, 2, 2],
  -db[2][u, dσ[1, -1][v]] // dm[1, -1, 1],
  db[2][u, dσ[1, -1][v]] // dm[-1, 1, 1]
];
dbdm@{UU[a[f4[b1, b2, b3], 1, 2]], UU[a[g8[b1, b2, b4], 2, 1]]}
```

$$\text{UU} \left[c \left[-b_1 \epsilon_1^3 \epsilon_5 \epsilon_{10} f_4 [b_1, b_2, b_3] g_8 [b_1, b_2, b_4] - b_1 \epsilon_1^2 \epsilon_7 \epsilon_{10} f_4 [b_1, b_2, b_3] g_8 [b_1, b_2, b_4], 2 \right] + c \left[b_2 \epsilon_1^3 \epsilon_5 \epsilon_{10} f_4 [b_1, b_2, b_3] g_8 [b_1, b_2, b_4] + b_2 \epsilon_1^2 \epsilon_7 \epsilon_{10} f_4 [b_1, b_2, b_3] g_8 [b_1, b_2, b_4], 1 \right] + \delta a \left[-b_1 \epsilon_1^2 \epsilon_5 \epsilon_{10} g_8 [b_1, b_2, b_4] f_4^{(1,0,0)} [b_1, b_2, b_3] - b_1 \epsilon_1 \epsilon_5 \epsilon_{13} g_8 [b_1, b_2, b_4] f_4^{(1,0,0)} [b_1, b_2, b_3] - b_1 \epsilon_1^2 \epsilon_5 \epsilon_{10} f_4 [b_1, b_2, b_3] g_8^{(1,0,0)} [b_1, b_2, b_4] - b_1 \epsilon_1 \epsilon_5 \epsilon_{13} f_4 [b_1, b_2, b_3] g_8^{(1,0,0)} [b_1, b_2, b_4], 2, 1 \right] + \delta a \left[b_2 \epsilon_1^2 \epsilon_5 \epsilon_{10} g_8 [b_1, b_2, b_4] f_4^{(1,0,0)} [b_1, b_2, b_3] + b_2 \epsilon_1 \epsilon_5 \epsilon_{13} g_8 [b_1, b_2, b_4] f_4^{(1,0,0)} [b_1, b_2, b_3] + b_2 \epsilon_1^2 \epsilon_5 \epsilon_{10} f_4 [b_1, b_2, b_3] g_8^{(1,0,0)} [b_1, b_2, b_4] + b_2 \epsilon_1 \epsilon_5 \epsilon_{13} f_4 [b_1, b_2, b_3] g_8^{(1,0,0)} [b_1, b_2, b_4], 1, 1 \right] \right]$$

$$\epsilon_7 = -\epsilon_1 \epsilon_5;$$

$$\epsilon_{13} = -\epsilon_1 \epsilon_{10};$$

```
hmhts[u_] :=
  (u // hm[2, 1, 1] // hts[1, 4]) - (u // hts[1, 4] // hts[2, 4] // hm[2, 1, 1]);
UU[δaa[f37[b4, b5], 4, 1, 4, 2]] // hmhts
UU[δβ[-2 b4^2 ε1 ε9 ε10 f37 [b4, b5] + 2 b4^2 ε17 f37 [b4, b5]]]
```

$\epsilon_{17} = \epsilon_1 \epsilon_9 \epsilon_{10};$

tthJacobi[*u_*, *v_*, *w_*] := **Plus**[
 -**thb**[0, 0][**tb**[0][*u*, *v*], *w*] + **tb**[0][**thb**[0, 0][*u*, *w*], *v*] - **thb**[0, 0][*v*,
thb[0, 0][*u*, *w*]] + **tb**[0][*u*, **thb**[0, 0][*v*, *w*]] + **thb**[0, 0][*u*, **thb**[0, 0][*v*, *w*]]
];

tthJacobi@@{**UU**[β [**f**₁[*b*₀, *b*₁]]], **UU**[**a**[**g**₂[*b*₀, *b*₂], 0, 3]], **UU**[**a**[**h**₂[*b*₃, *b*₄], 3, 0]]}

UU[c [-*b*₀ *b*₃ $\epsilon_1^3 \epsilon_{10} \epsilon_{18}$ **g**₂[*b*₀, *b*₂] **h**₂[*b*₃, *b*₄] **f**₁^(1,0)[*b*₀, *b*₁] +
*b*₀ *b*₃ $\epsilon_1^3 \epsilon_{10} \epsilon_{30}$ **g**₂[*b*₀, *b*₂] **h**₂[*b*₃, *b*₄] **f**₁^(1,0)[*b*₀, *b*₁], 3] +
 δa [*b*₀ $\epsilon_1^2 \epsilon_{10} \epsilon_{18}$ **g**₂[*b*₀, *b*₂] **h**₂[*b*₃, *b*₄] **f**₁^(1,0)[*b*₀, *b*₁] -
*b*₀ $\epsilon_1^2 \epsilon_{10} \epsilon_{30}$ **g**₂[*b*₀, *b*₂] **h**₂[*b*₃, *b*₄] **f**₁^(1,0)[*b*₀, *b*₁], 3, 3]]]

$\epsilon_{30} = \epsilon_{18};$

tmhts[*u_*] :=
 (*u* // **tm**[2, 1, 1] // **hts**[4, 1]) - (*u* // **hts**[4, 2] // **hts**[4, 1] // **tm**[2, 1, 1]);
tmhts@@**UU**[$\delta a a$ [**f**₃₂[*b*₁, *b*₂, *b*₃], 1, 4, 2, 4]]

UU[$\delta \beta$ [2 *b*₁² $\epsilon_1 \epsilon_9 \epsilon_{10}$ **f**₃₂[*b*₁, *b*₁, *b*₃] - *b*₁² $\epsilon_9 \epsilon_{14}$ **f**₃₂[*b*₁, *b*₁, *b*₃] - *b*₁² $\epsilon_9 \epsilon_{15}$ **f**₃₂[*b*₁, *b*₁, *b*₃]]]

$\epsilon_{15} = \epsilon_{14} = \epsilon_1 \epsilon_{10};$

dmdb[*u_*, *v_*] := **db**[3][*u* // **dm**[1, 2, 3], *v*] -
dm[3, 2, 3][**db**[3][*u* // **dσ**[1, 3], *v*]] - **dm**[1, 3, 3][**db**[3][*u* // **dσ**[2, 3], *v*]];
dmdb@@{**UU**[**a**[**f**₈[*b*₁, *b*₂, *b*₄], 2, 1]], **UU**[**a**[**g**₄[*b*₃, *b*₅], 3, 5]]}

UU[0]

$\epsilon_{18} = \epsilon_1^2 \epsilon_5 \epsilon_{10} / \epsilon_6;$

Table[ϵ_i , {*i*, 0, 48}]

{ ϵ_1 , ϵ_1 , $\epsilon_1 \epsilon_{10}$, ϵ_5 , ϵ_{10} , ϵ_5 , ϵ_6 , $-\epsilon_1 \epsilon_5$, $\epsilon_5 \epsilon_9$, ϵ_9 , ϵ_{10} , $\epsilon_1 \epsilon_{10}$, $\epsilon_1 \epsilon_{10}$, $-\epsilon_1 \epsilon_{10}$, $\epsilon_1 \epsilon_{10}$, $\epsilon_1 \epsilon_{10}$,
 $-\epsilon_1 \epsilon_9 \epsilon_{10}$, $\epsilon_1 \epsilon_9 \epsilon_{10}$, $\frac{\epsilon_1^2 \epsilon_5 \epsilon_{10}}{\epsilon_6}$, $\epsilon_1 \epsilon_5$, $\epsilon_1 \epsilon_5$, $\epsilon_1^2 \epsilon_5$, $\epsilon_1 \epsilon_5$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1 \epsilon_{10}$,
 $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\frac{\epsilon_1^2 \epsilon_5 \epsilon_{10}}{\epsilon_6}$, $\epsilon_1 \epsilon_5$, $\epsilon_1^2 \epsilon_5 \epsilon_{10}$, $\epsilon_1^2 \epsilon_5 \epsilon_{10}$, $\epsilon_1^2 \epsilon_5 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_5$,
 $\epsilon_1 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$, $\epsilon_1^2 \epsilon_{10}$ }

Table[*i* → ϵ_i , {*i*, 0, 48}]

{0 → ϵ_1 , 1 → ϵ_1 , 2 → $\epsilon_1 \epsilon_{10}$, 3 → ϵ_5 , 4 → ϵ_{10} , 5 → ϵ_5 , 6 → ϵ_6 , 7 → $-\epsilon_1 \epsilon_5$, 8 → $\epsilon_5 \epsilon_9$,
 9 → ϵ_9 , 10 → ϵ_{10} , 11 → $\epsilon_1 \epsilon_{10}$, 12 → $\epsilon_1 \epsilon_{10}$, 13 → $-\epsilon_1 \epsilon_{10}$, 14 → $\epsilon_1 \epsilon_{10}$, 15 → $\epsilon_1 \epsilon_{10}$,
 16 → $-\epsilon_1 \epsilon_9 \epsilon_{10}$, 17 → $\epsilon_1 \epsilon_9 \epsilon_{10}$, 18 → ϵ_{18} , 19 → $\epsilon_1 \epsilon_5$, 20 → $\epsilon_1 \epsilon_5$, 21 → $\epsilon_1^2 \epsilon_5$,
 22 → $\epsilon_1 \epsilon_5$, 23 → $\epsilon_1^2 \epsilon_{10}$, 24 → $\epsilon_1 \epsilon_{10}$, 25 → $\epsilon_1^2 \epsilon_{10}$, 26 → $\epsilon_1 \epsilon_{10}$, 27 → $\epsilon_1^2 \epsilon_{10}$, 28 → $\epsilon_1^2 \epsilon_{10}$,
 29 → $\epsilon_1^2 \epsilon_{10}$, 30 → ϵ_{18} , 31 → $\epsilon_1 \epsilon_5$, 32 → $\epsilon_1^2 \epsilon_5 \epsilon_{10}$, 33 → $\epsilon_1^2 \epsilon_5 \epsilon_{10}$, 34 → $\epsilon_1^2 \epsilon_5 \epsilon_{10}$,
 35 → $\epsilon_1^2 \epsilon_{10}$, 36 → $\epsilon_1^2 \epsilon_5$, 37 → $\epsilon_1 \epsilon_{10}$, 38 → $\epsilon_1^2 \epsilon_{10}$, 39 → $\epsilon_1 \epsilon_{10}$, 40 → $\epsilon_1^2 \epsilon_{10}$, 41 → $\epsilon_1^2 \epsilon_{10}$,
 42 → $\epsilon_1^2 \epsilon_{10}$, 43 → $\epsilon_1^2 \epsilon_{10}$, 44 → $\epsilon_1^3 \epsilon_{10}$, 45 → $\epsilon_1^2 \epsilon_{10}$, 46 → $\epsilon_1^2 \epsilon_{10}$, 47 → $\epsilon_1^2 \epsilon_{10}$, 48 → $\epsilon_1^2 \epsilon_{10}$ }