

Pensieve header: Fixing many many signs for SnG.

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

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[0]

ε16 = ε8 ε14;

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[0]

ε7 = ε8 ε13;

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[0]

ε13 = ε11;

tmhts[u_] :=
  (u // tm[1, 2, 1] // hts[4, 1]) - (u // hts[4, 1] // hts[4, 2] // tm[1, 2, 1]);
tmhts@UU[δaa[f32[b1, b2, b3], 1, 4, 2, 4]]
UU[0]

ε14 = ε3;

tmhts[u_] :=
  (u // tm[2, 1, 1] // hts[4, 1]) - (u // hts[4, 2] // hts[4, 1] // tm[2, 1, 1]);
tmhts@UU[δaa[f32[b1, b2, b3], 1, 4, 2, 4]]
UU[δβ[-b12 ε1 ε8 f32[b1, b1, b3] - b12 ε8 ε15 f32[b1, b1, b3]]]

ε15 = -ε1;

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 ε8 ε10 f24[b4, b5] - b4 ε8 ε12 f24[b4, b5]]]

ε12 = ε10;

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hmhts[u_] :=
  (u // hm[1, 2, 1] // hts[1, 4]) - (u // hts[2, 4] // hts[1, 4] // hm[1, 2, 1]);
hmhts@UU[δaa[f37[b4, b5], 4, 1, 4, 2]]
UU[δβ[b42 ε1 ε8 f37[b4, b5] + b42 ε3 ε8 f37[b4, b5]]]

ε3 = -ε1;

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 ε1 ε8 f43[b4, b5] + b4 b5 ε2 ε8 f43[b4, b5]]]

ε2 = ε1;

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 ε40 ε48 g2[b0, b2] f2(1,0)[b0, b1] + b0 ε41 ε48 g2[b0, b2] f2(1,0)[b0, b1], 3, 0, 1] +
  ca[-b0 ε40 ε48 f2[b0, b1] g2(1,0)[b0, b2] + b0 ε41 ε48 f2[b0, b1] g2(1,0)[b0, b2], 1, 0, 3] +
  δaa[ε40 g2[b0, b2] f2(1,0)[b0, b1] - ε41 g2[b0, b2] f2(1,0)[b0, b1] +
  ε40 f2[b0, b1] g2(1,0)[b0, b2] - ε41 f2[b0, b1] g2(1,0)[b0, b2], 0, 1, 0, 3]]

ε41 = ε40;

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 ε40 ε48 f2[b0, b1] g6(1,0)[b0, b2] + b0 ε42 ε48 f2[b0, b1] g6(1,0)[b0, b2], 1, 2, 3] +
  δaa[ε40 f2[b0, b1] g6(1,0)[b0, b2] - ε42 f2[b0, b1] g6(1,0)[b0, b2], 0, 1, 2, 3]]

ε42 = ε40;

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[δa[h3[b5, b6], 5, 0]]}
UU[δa[b1 b5 ε18 ε20 f2[b1, b2] g2[b3, b4] h3[b5, b6] - b1 b5 ε202 f2[b1, b2] g2[b3, b4] h3[b5, b6],
  3, 0] + δa[-b3 b5 ε18 ε20 f2[b1, b2] g2[b3, b4] h3[b5, b6] +
  b3 b5 ε202 f2[b1, b2] g2[b3, b4] h3[b5, b6], 1, 0]]

ε20 = ε18;

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[c[h11[b5, b6], 0]]}
UU[δa[-b1 ε18 ε19 f2[b1, b2] g2[b3, b4] h11[b5, b6] + b1 ε192 ε48 f2[b1, b2] g2[b3, b4] h11[b5, b6],
  3, 0] + δa[b3 ε18 ε19 f2[b1, b2] g2[b3, b4] h11[b5, b6] -
  b3 ε192 ε48 f2[b1, b2] g2[b3, b4] h11[b5, b6], 1, 0]]

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$\epsilon_{18} = \epsilon_{19} \epsilon_{48};$

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

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

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

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

$\text{UU}[ca[-b_1 b_5 \epsilon_{22}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] +$

$b_1 b_5 \epsilon_{19} \epsilon_{22} \epsilon_{48} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 0, 3, 0] +$

$ca[b_3 b_5 \epsilon_{22}^2 f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] -$

$b_3 b_5 \epsilon_{19} \epsilon_{22} \epsilon_{48} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 0, 1, 0] +$

$\delta a[-b_1 b_5 \epsilon_1 \epsilon_{21} \epsilon_{22} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] +$

$b_1 b_5 \epsilon_1 \epsilon_{21} \epsilon_{24} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 3, 0] +$

$\delta a[b_3 b_5 \epsilon_1 \epsilon_{21} \epsilon_{22} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] -$

$b_3 b_5 \epsilon_1 \epsilon_{21} \epsilon_{24} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 1, 0] + \delta a a[$

$b_1 \epsilon_{21} \epsilon_{22} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] - 2 b_1 \epsilon_{21} \epsilon_{23} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] -$

$b_1 \epsilon_{21} \epsilon_{24} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] + b_1 \epsilon_{19} \epsilon_{21} \epsilon_{48} f_2[b_1, b_2] g_2[b_3, b_4]$

$h_{13}[b_5, b_6] + b_1 \epsilon_{21}^2 \epsilon_{48} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 3, 0, 5, 0] + \delta a a[$

$-b_3 \epsilon_{21} \epsilon_{22} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] + 2 b_3 \epsilon_{21} \epsilon_{23} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] +$

$b_3 \epsilon_{21} \epsilon_{24} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6] - b_3 \epsilon_{19} \epsilon_{21} \epsilon_{48} f_2[b_1, b_2] g_2[b_3, b_4]$

$h_{13}[b_5, b_6] - b_3 \epsilon_{21}^2 \epsilon_{48} f_2[b_1, b_2] g_2[b_3, b_4] h_{13}[b_5, b_6], 1, 0, 5, 0]]]$

$\epsilon_{22} = \epsilon_{19} \epsilon_{48};$

$\epsilon_{24} = \epsilon_{19} \epsilon_{48};$

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

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

$\text{hbJacobi}@\{\text{UU}[\delta a a[f_{28}[b_1, b_2], 2, 0, 2, 1]],$

$\text{UU}[a[g_6[b_3, b_4], 4, 0]], \text{UU}[a[h_6[b_5, b_6], 6, 0]]\}$

$\text{UU}[ca[-b_2^2 b_4 \epsilon_4 \epsilon_{19} \epsilon_{23} \epsilon_{48} f_{28}[b_1, b_2] g_6[b_3, b_4] h_6[b_5, b_6] +$

$b_2^2 b_4 \epsilon_4 \epsilon_{21} \epsilon_{23} \epsilon_{48} f_{28}[b_1, b_2] g_6[b_3, b_4] h_6[b_5, b_6], 0, 6, 1] +$

$ca[b_2^2 b_6 \epsilon_4 \epsilon_{19} \epsilon_{23} \epsilon_{48} f_{28}[b_1, b_2] g_6[b_3, b_4] h_6[b_5, b_6] -$

$b_2^2 b_6 \epsilon_4 \epsilon_{21} \epsilon_{23} \epsilon_{48} f_{28}[b_1, b_2] g_6[b_3, b_4] h_6[b_5, b_6], 0, 4, 1] +$

$\delta a a[-b_2 b_4 \epsilon_4 \epsilon_{21} \epsilon_{23} f_{28}[b_1, b_2] g_6[b_3, b_4] h_6[b_5, b_6] +$

$b_2 b_4 \epsilon_{19} \epsilon_{23} \epsilon_{48} f_{28}[b_1, b_2] g_6[b_3, b_4] h_6[b_5, b_6], 2, 0, 6, 1] +$

$\delta a a[b_2 b_6 \epsilon_4 \epsilon_{21} \epsilon_{23} f_{28}[b_1, b_2] g_6[b_3, b_4] h_6[b_5, b_6] -$

$b_2 b_6 \epsilon_{19} \epsilon_{23} \epsilon_{48} f_{28}[b_1, b_2] g_6[b_3, b_4] h_6[b_5, b_6], 2, 0, 4, 1]]]$

$\epsilon_{21} = \epsilon_{19};$

$\epsilon_{48} = \epsilon_4;$

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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[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 ε4 ε19 f2[b1, b2] g2[b3, b4] h13[b5, b6] - 2 b1 ε19 ε23 f2[b1, b2] g2[b3, b4] h13[b5, b6],
  3, 0, 5, 0] + δaa[-2 b3 ε4 ε19 f2[b1, b2] g2[b3, b4] h13[b5, b6] +
  2 b3 ε19 ε23 f2[b1, b2] g2[b3, b4] h13[b5, b6], 1, 0, 5, 0]]

ε23 = ε4 ε19;

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 ε4 ε19 ε25 f2[b0, b1] g2[b2, b3] h2[b4, b5] - b0 b2 ε25 f2[b0, b1] g2[b2, b3] h2[b4, b5],
  4, 1] + a[-b0 b4 ε4 ε19 ε25 f2[b0, b1] g2[b2, b3] h2[b4, b5] +
  b0 b4 ε25 f2[b0, b1] g2[b2, b3] h2[b4, b5], 2, 1] +
  ca[-b2 ε4 ε19 ε26 f2[b0, b1] g2[b2, b3] h2[b4, b5] + b2 ε25 ε26 f2[b0, b1]
    g2[b2, b3] h2[b4, b5] + b0 b2 ε4 ε25 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] -
  b0 b2 ε4 ε37 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 0, 4, 1] +
  ca[-b2 ε25 ε26 f2[b0, b1] g2[b2, b3] h2[b4, b5] + b2 ε4 ε25 ε44 f2[b0, b1]
    g2[b2, b3] h2[b4, b5] - b0 b2 ε4 ε36 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] +
  b0 b2 ε4 ε37 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 1, 4, 0] +
  ca[b4 ε25 ε26 f2[b0, b1] g2[b2, b3] h2[b4, b5] - b4 ε4 ε25 ε44 f2[b0, b1] g2[b2, b3] h2[b4, b5] +
  b0 b4 ε4 ε36 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] -
  b0 b4 ε4 ε37 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 1, 2, 0] +
  ca[b4 ε4 ε19 ε26 f2[b0, b1] g2[b2, b3] h2[b4, b5] - b4 ε25 ε26 f2[b0, b1] g2[b2, b3] h2[b4, b5] -
  b0 b4 ε4 ε25 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] +
  b0 b4 ε4 ε37 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 0, 2, 1] +
  δa[-b0 b2 ε35 ε45 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] + b0 b2 ε35 ε46 g2[b2, b3]
    h2[b4, b5] f2^(1,0)[b0, b1] - b0 b2 ε4 ε19 ε47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] +
  b0 b2 ε25 ε47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 4, 1] +
  δa[b0 b4 ε35 ε45 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] - b0 b4 ε35 ε46 g2[b2, b3]
    h2[b4, b5] f2^(1,0)[b0, b1] + b0 b4 ε4 ε19 ε47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] -
  b0 b4 ε25 ε47 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 2, 1] +
  δaa[-b2 ε25 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] +
  b2 ε37 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 0, 0, 4, 1] +
  δaa[b4 ε25 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1] -
  b4 ε37 ε44 g2[b2, b3] h2[b4, b5] f2^(1,0)[b0, b1], 0, 0, 2, 1]]

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$$\epsilon_{37} = \epsilon_{25};$$

$$\epsilon_{25} = \epsilon_4 \epsilon_{19};$$

$$\epsilon_{46} = \epsilon_{45};$$

$$\epsilon_{36} = \epsilon_4 \epsilon_{19};$$

$$\epsilon_{26} = \epsilon_4 \epsilon_{44};$$

```
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[deltaaa[f23[b0, b1], 0, 2, 0, 2]], UU[a[g6[b2, b3], 3, 0]], UU[a[h6[b4, b5], 5, 0]]}
```

$$\begin{aligned} & \text{UU} \left[\delta a \left[b_0^2 b_3 \epsilon_1 \epsilon_4^2 \epsilon_{19}^2 f_{23}[b_0, b_1] g_6[b_2, b_3] h_6[b_4, b_5] - \right. \right. \\ & \quad \left. \left. b_0^2 b_3 \epsilon_1 \epsilon_4 \epsilon_{19} \epsilon_{35} f_{23}[b_0, b_1] g_6[b_2, b_3] h_6[b_4, b_5], 5, 2 \right] + \right. \\ & \quad \delta a \left[-b_0^2 b_5 \epsilon_1 \epsilon_4^2 \epsilon_{19}^2 f_{23}[b_0, b_1] g_6[b_2, b_3] h_6[b_4, b_5] + \right. \\ & \quad \left. b_0^2 b_5 \epsilon_1 \epsilon_4 \epsilon_{19} \epsilon_{35} f_{23}[b_0, b_1] g_6[b_2, b_3] h_6[b_4, b_5], 3, 2 \right] + \\ & \quad \delta a a \left[b_0 b_3 \epsilon_4^2 \epsilon_{19}^2 f_{23}[b_0, b_1] g_6[b_2, b_3] h_6[b_4, b_5] - b_0 b_3 \epsilon_{38}^2 f_{23}[b_0, b_1] g_6[b_2, b_3] h_6[b_4, b_5], \right. \\ & \quad \left. 0, 2, 5, 2 \right] + \delta a a \left[-b_0 b_5 \epsilon_4^2 \epsilon_{19}^2 f_{23}[b_0, b_1] g_6[b_2, b_3] h_6[b_4, b_5] + \right. \\ & \quad \left. b_0 b_5 \epsilon_{38}^2 f_{23}[b_0, b_1] g_6[b_2, b_3] h_6[b_4, b_5], 0, 2, 3, 2 \right] \end{aligned}$$

$$\epsilon_{19} = 1 / \epsilon_4;$$

$$\epsilon_{35} = 1;$$

```
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]]}
```

$$\begin{aligned} & \text{UU} \left[\delta a \left[b_0 \epsilon_{27} f_2[b_0, b_1] g_2[b_2, b_3] h_{11}[b_4, b_5] - \frac{b_0 \epsilon_{28} f_2[b_0, b_1] g_2[b_2, b_3] h_{11}[b_4, b_5]}{\epsilon_4}, 2, 1 \right] + \right. \\ & \quad \left. \delta a \left[-b_2 \epsilon_{27} f_2[b_0, b_1] g_2[b_2, b_3] h_{11}[b_4, b_5] + \frac{b_2 \epsilon_{28} f_2[b_0, b_1] g_2[b_2, b_3] h_{11}[b_4, b_5]}{\epsilon_4}, 0, 1 \right] \right] \end{aligned}$$

$$\epsilon_{28} = \epsilon_4 \epsilon_{27};$$

```

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 ε4 ε29 f2[b0, b1] g2[b2, b3] h13[b4, b5] + b0 b4 ε30 f2[b0, b1] g2[b2, b3] h13[b4, b5] -
  b0 b4 ε32 f2[b0, b1] g2[b2, b3] h13[b4, b5] - b0 b4 ε33 f2[b0, b1] g2[b2, b3] h13[b4, b5],
  0, 2, 1] + ca[-b0 b4 ε4 ε29 f2[b0, b1] g2[b2, b3] h13[b4, b5] -
  b0 b4 ε30 f2[b0, b1] g2[b2, b3] h13[b4, b5] + b0 b4 ε32 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
  b0 b4 ε33 f2[b0, b1] g2[b2, b3] h13[b4, b5], 1, 2, 0] +
ca[b2 b4 ε4 ε29 f2[b0, b1] g2[b2, b3] h13[b4, b5] + b2 b4 ε30 f2[b0, b1] g2[b2, b3] h13[b4, b5] -
  b2 b4 ε32 f2[b0, b1] g2[b2, b3] h13[b4, b5] - b2 b4 ε33 f2[b0, b1] g2[b2, b3] h13[b4, b5],
  1, 0, 0] + ca[-b2 b4 ε4 ε29 f2[b0, b1] g2[b2, b3] h13[b4, b5] -
  b2 b4 ε30 f2[b0, b1] g2[b2, b3] h13[b4, b5] + b2 b4 ε32 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
  b2 b4 ε33 f2[b0, b1] g2[b2, b3] h13[b4, b5], 0, 0, 1] +
δa[b0 b4 ε31 f2[b0, b1] g2[b2, b3] h13[b4, b5] -  $\frac{b_0 b_4 \epsilon_{34} f_2[b_0, b_1] g_2[b_2, b_3] h_{13}[b_4, b_5]}{\epsilon_4}$ ,
  2, 1] + δa[-b2 b4 ε31 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
   $\frac{b_2 b_4 \epsilon_{34} f_2[b_0, b_1] g_2[b_2, b_3] h_{13}[b_4, b_5]}{\epsilon_4}$ , 0, 1] +
δaa[-b2 ε29 f2[b0, b1] g2[b2, b3] h13[b4, b5] +  $\frac{b_2 \epsilon_{32} f_2[b_0, b_1] g_2[b_2, b_3] h_{13}[b_4, b_5]}{\epsilon_4}$ ,
  0, 0, 4, 1] + δaa[b0 ε29 f2[b0, b1] g2[b2, b3] h13[b4, b5] +
   $\frac{b_0 \epsilon_{30} f_2[b_0, b_1] g_2[b_2, b_3] h_{13}[b_4, b_5]}{\epsilon_4}$  -  $\frac{b_0 \epsilon_{32} f_2[b_0, b_1] g_2[b_2, b_3] h_{13}[b_4, b_5]}{\epsilon_4}$  -
   $\frac{b_0 \epsilon_{33} f_2[b_0, b_1] g_2[b_2, b_3] h_{13}[b_4, b_5]}{\epsilon_4}$ , 2, 0, 4, 1] +
δaa[- $\frac{b_4 \epsilon_{30} f_2[b_0, b_1] g_2[b_2, b_3] h_{13}[b_4, b_5]}{\epsilon_4}$  +  $\frac{b_4 \epsilon_{33} f_2[b_0, b_1] g_2[b_2, b_3] h_{13}[b_4, b_5]}{\epsilon_4}$ ,
  0, 0, 2, 1]]

```

$\epsilon_{33} = \epsilon_{30}$;

$\epsilon_{32} = \epsilon_4 \epsilon_{29}$;

$\epsilon_{34} = \epsilon_4 \epsilon_{31}$;

```

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 ε4 ε27 f2[b0, b1] g2[b2, b3] h21[b4, b5] +
  b0 b2 b4 ε4 ε31 f2[b0, b1] g2[b2, b3] h21[b4, b5], 4, 1] +
  δa[b0 b4^2 ε1 ε4 ε27 f2[b0, b1] g2[b2, b3] h21[b4, b5] -
  b0 b4^2 ε4 ε31 f2[b0, b1] g2[b2, b3] h21[b4, b5], 2, 1] +
  δaa[b2 b4 ε4 ε29 f2[b0, b1] g2[b2, b3] h21[b4, b5] - b2 b4 ε30 f2[b0, b1] g2[b2, b3] h21[b4, b5],
  0, 0, 4, 1] + δaa[-b4^2 ε4 ε29 f2[b0, b1] g2[b2, b3] h21[b4, b5] +
  b4^2 ε30 f2[b0, b1] g2[b2, b3] h21[b4, b5], 0, 0, 2, 1]]
ε30 = ε4 ε29;
ε31 = ε1 ε27;
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[f1[b0, b1]]], UU[a[g2[b0, b2], 0, 3]], UU[a[h2[b3, b4], 3, 0]]}
UU[c[-b0 b3 ε4 ε39 g2[b0, b2] h2[b3, b4] f1^(1,0)[b0, b1] +
  b0 b3 ε4^2 ε27 ε43 g2[b0, b2] h2[b3, b4] f1^(1,0)[b0, b1], 3] +
  δa[b0 ε39 g2[b0, b2] h2[b3, b4] f1^(1,0)[b0, b1] -
  b0 ε4 ε27 ε43 g2[b0, b2] h2[b3, b4] f1^(1,0)[b0, b1], 3, 3]]
ε43 = ε18 ε39 / ε27 / ε4;

```

```

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 ε17 f2[b0, b1] g2[b0, b2] h2[b3, b4] - b3 ε4 ε40 f2[b0, b1] g2[b0, b2] h2[b3, b4], 1, 0, 3] +
  ca[b0 ε17 f2[b0, b1] g2[b0, b2] h2[b3, b4] - b0 ε4 ε29 ε44 f2[b0, b1] g2[b0, b2] h2[b3, b4] +
    b0 ε4 ε40 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] -
    b0 ε4 ε29 ε44 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 1, 3, 3] +
  ca[-b0 ε17 f2[b0, b1] g2[b0, b2] h2[b3, b4] + b0 ε4 ε29 ε44 f2[b0, b1] g2[b0, b2] h2[b3, b4] -
    b0 ε4 ε40 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] +
    b0 ε4 ε29 ε44 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 3, 3, 1] +
  ca[-b3 ε17 f2[b0, b1] g2[b0, b2] h2[b3, b4] + b3 ε4 ε40 f2[b0, b1] g2[b0, b2] h2[b3, b4] -
    b0 b3 ε4 ε40 g2[b0, b2] h2[b3, b4] f2^(1,0)[b0, b1] + b0 b3 ε4 ε29 ε44 g2[b0, b2]
    h2[b3, b4] f2^(1,0)[b0, b1] + b0 b3 ε4 ε40 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] -
    b0 b3 ε4 ε29 ε44 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 3, 0, 1] +
  daa[b3 ε40 g2[b0, b2] h2[b3, b4] f2^(1,0)[b0, b1] - b3 ε38 ε40 g2[b0, b2]
    h2[b3, b4] f2^(1,0)[b0, b1] - b3 ε40 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] +
    b3 ε38 ε40 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 0, 1, 0, 3] +
  daa[b0 ε38 ε40 g2[b0, b2] h2[b3, b4] f2^(1,0)[b0, b1] - b0 ε4 ε29 ε44 g2[b0, b2]
    h2[b3, b4] f2^(1,0)[b0, b1] - b0 ε38 ε40 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2] +
    b0 ε4 ε29 ε44 f2[b0, b1] h2[b3, b4] g2^(1,0)[b0, b2], 0, 1, 3, 3]]
ε40 = ε17 / ε4;
ε17 = ε4 ε29 ε44;
ε38 = 1;
dbAS[u_, v_] := db[0][u, v] + db[0][v, u];
dbAS@@{UU[a[f2[b0, b1, b2], 0, 0]], UU[a[g2[b0, b3, b4], 0, 0]]}
UU[c[2 b0 ε4 ε11 f2[b0, b1, b2] g2[b0, b3, b4] - 2 b0 ε4 ε10 ε29 ε44 f2[b0, b1, b2] g2[b0, b3, b4] +
  b0 ε4 ε11 g2[b0, b3, b4] f2^(1,0,0)[b0, b1, b2] - b0 ε4 ε10 ε29 ε44 g2[b0, b3, b4]
  f2^(1,0,0)[b0, b1, b2] + b0 ε4 ε11 f2[b0, b1, b2] g2^(1,0,0)[b0, b3, b4] -
  b0 ε4 ε10 ε29 ε44 f2[b0, b1, b2] g2^(1,0,0)[b0, b3, b4], 0] +
  da[-2 ε11 f2[b0, b1, b2] g2[b0, b3, b4] + 2 ε4 ε10 ε29 ε44 f2[b0, b1, b2] g2[b0, b3, b4] -
  b0 ε11 g2[b0, b3, b4] f2^(1,0,0)[b0, b1, b2] + b0 ε4 ε10 ε29 ε44 g2[b0, b3, b4]
  f2^(1,0,0)[b0, b1, b2] - b0 ε11 f2[b0, b1, b2] g2^(1,0,0)[b0, b3, b4] +
  b0 ε4 ε10 ε29 ε44 f2[b0, b1, b2] g2^(1,0,0)[b0, b3, b4], 0, 0]]
ε11 = ε4 ε10 ε29 ε44;

```



```
dbJacobi[u_, v_, w_] :=  
  db[0][u, db[0][v, w]] + db[0][v, db[0][w, u]] + db[0][w, db[0][u, v]];  
dbJacobi @@ {UU[a[f2[b0, b1, b2], 0, 0]], UU[a[g4[b0, b3, b4], 0, 3]],  
  UU[a[h8[b0, b5, b6], 5, 0]]}
```

$$\begin{aligned}
 & \text{UU} \left[c \left[b_0 b_5 \epsilon_4^3 \epsilon_{10} \epsilon_{27} \epsilon_{44} 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 b_0 b_5 \epsilon_4^3 \epsilon_{10} \epsilon_{29} \epsilon_{44} 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 \epsilon_4^2 \epsilon_{27} \epsilon_{44} 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_4^2 \epsilon_{27} \epsilon_{45} 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_4^3 \epsilon_{10} \epsilon_{29} \epsilon_{44} 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_4 \epsilon_{45} 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 \epsilon_4^2 \epsilon_{27} \epsilon_{44} 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_4^3 \epsilon_{10} \epsilon_{29} \epsilon_{44} 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 \epsilon_4^3 \epsilon_{27} \epsilon_{29} \epsilon_{44} 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 \left. b_0^2 b_5 \epsilon_4 \epsilon_{45} 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] + \\
 & \text{ca} \left[b_0^2 \epsilon_4 \epsilon_{44} 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 2 b_0^2 \epsilon_4^2 \epsilon_{29} \epsilon_{44} 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 \left. b_0^2 \epsilon_4^3 \epsilon_{29} \epsilon_{44} 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] + \\
 & \text{ca} \left[-b_0 b_5 \epsilon_4 \epsilon_{44} 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 2 b_0 b_5 \epsilon_4^2 \epsilon_{29} \epsilon_{44} 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 \left. b_0 b_5 \epsilon_4^3 \epsilon_{29} \epsilon_{44} 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] + \\
 & \text{ca} \left[b_5 \epsilon_4 \epsilon_{44} 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 b_5 \epsilon_4^2 \epsilon_{29} \epsilon_{44} 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 b_5 \epsilon_4^2 \epsilon_{29} \epsilon_{44} 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 \left. b_0 b_5 \epsilon_4^3 \epsilon_{29} \epsilon_{44} 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_4^2 \epsilon_{10} \epsilon_{27} \epsilon_{44} 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 b_0 \epsilon_4^2 \epsilon_{10} \epsilon_{29} \epsilon_{44} 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 \epsilon_4^2 \epsilon_{10} \epsilon_{27} \epsilon_{44} 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 \epsilon_4 \epsilon_{27} \epsilon_{47} 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 \epsilon_4^2 \epsilon_{10} \epsilon_{29} \epsilon_{44} 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 \left. b_0^2 \epsilon_{47} 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_4 \epsilon_{27} \epsilon_{44} 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 b_0 b_5 \epsilon_4^2 \epsilon_{10} \epsilon_{27} \epsilon_{44} 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 b_5 \epsilon_4 \epsilon_{27} \epsilon_{45} 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 b_5 \epsilon_4 \epsilon_{27} \epsilon_{47} 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 b_5 \epsilon_1 \epsilon_4 \epsilon_{27} \epsilon_{44} 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 b_5 \epsilon_4^2 \epsilon_{10} \epsilon_{29} \epsilon_{44} 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 b_5 \epsilon_1 \epsilon_4^2 \epsilon_{27} \epsilon_{29} \epsilon_{44} 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 \left. b_0 b_5 \epsilon_{47} 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 a a \left[b_5 \epsilon_{44} 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_5 \epsilon_4 \epsilon_{29} \epsilon_{44} 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 a a \left[-\epsilon_{44} 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_4 \epsilon_{29} \epsilon_{44} f_2 [b_0, b_1, b_2] \right. \\
 & \quad g_4 [b_0, b_3, b_4] h_8 [b_0, b_5, b_6] - b_0 \epsilon_{44} 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 2 b_0 \epsilon_4 \epsilon_{29} \epsilon_{44} 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 \left. b_0 \epsilon_4^2 \epsilon_{29} \epsilon_{44} 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}$$

$$\epsilon_{29} = 1 / \epsilon_4 ;$$

$$\epsilon_{47} = \epsilon_4 \epsilon_{10} \epsilon_{44} ;$$

$$\epsilon_{45} = \epsilon_1 \epsilon_{44};$$

$$\epsilon_{27} = 1 / \epsilon_4;$$

$$\epsilon_1 = \epsilon_4 \epsilon_{10};$$

dbdm[**u_**, **v_**] := **Plus**[

db[1][**u**, **d** σ [2, -2][**v**]] // **dm**[2, -2, 2],
-db[1][**u**, **d** σ [2, -2][**v**]] // **dm**[-2, 2, 2],
-db[2][**u**, **d** σ [1, -1][**v**]] // **dm**[1, -1, 1],
db[2][**u**, **d** σ [1, -1][**v**]] // **dm**[-1, 1, 1]

];

dbdm@@{**UU**[**a**[**f**₂[**b**₁, **b**₂, **b**₃], 1, 1]], **UU**[**a**[**g**₄[**b**₁, **b**₂, **b**₄], 1, 2]]}

UU[δa [-2 **b**₁ $\epsilon_4 \epsilon_{10} \epsilon_{44}$ **g**₄[**b**₁, **b**₂, **b**₄] $f_2^{(0,1,0)}$ [**b**₁, **b**₂, **b**₃], 1, 2]]]

$$\epsilon_9 = \epsilon_4 \epsilon_{10};$$

dbdm[**u_**, **v_**] := **Plus**[

db[1][**u**, **d** σ [2, -2][**v**]] // **dm**[2, -2, 2],
-db[1][**u**, **d** σ [2, -2][**v**]] // **dm**[-2, 2, 2],
-db[2][**u**, **d** σ [1, -1][**v**]] // **dm**[1, -1, 1],
db[2][**u**, **d** σ [1, -1][**v**]] // **dm**[-1, 1, 1]

];

dbdm@@{**UU**[**a**[**f**[**b**₂], 1, 1]], **UU**[**a**[1, 1, 2]]}

UU[c [-**b**₁² $\epsilon_4 \epsilon_9 \epsilon_{44}$ f' [**b**₂] + **b**₁² $\epsilon_4 \epsilon_{10} \epsilon_{44} \epsilon_{48}$ f' [**b**₂], 2] +
 δa [-**b**₁ $\epsilon_4 \epsilon_{10} \epsilon_{44}$ f' [**b**₂] + **b**₁ $\epsilon_{14} \epsilon_{44}$ f' [**b**₂], 1, 2]]]

bb4 = **bb**[1, 2, 3, 4]; **bbAS**[**u_**, **v_**] := **bb4**[**u**, **v**] + **bb4**[**v**, **u**];

bbAS@@{**UU**[**a**[**f**₂[**b**₁, **b**₂], 1, 1]], **UU**[**a**[**g**₆[**b**₁, **b**₂], 2, 1]]}

UU[c [-**b**₁ **b**₂ $\epsilon_4 \epsilon_9 \epsilon_{44}$ **g**₆[**b**₁, **b**₂] $f_2^{(0,1)}$ [**b**₁, **b**₂] + **b**₁ **b**₂ $\epsilon_4^2 \epsilon_{10} \epsilon_{44}$ **g**₆[**b**₁, **b**₂] $f_2^{(0,1)}$ [**b**₁, **b**₂], 1] +
 δa [-2 **b**₁ $\epsilon_4 \epsilon_{10} \epsilon_{44}$ **g**₆[**b**₁, **b**₂] $f_2^{(0,1)}$ [**b**₁, **b**₂], 2, 1]]]

Table[**i** → ϵ_i , {**i**, 48}]

{1 → $\epsilon_4 \epsilon_{10}$, 2 → $\epsilon_4 \epsilon_{10}$, 3 → $-\epsilon_4 \epsilon_{10}$, 4 → ϵ_4 , 5 → ϵ_5 , 6 → ϵ_6 , 7 → $\epsilon_4 \epsilon_8 \epsilon_{10} \epsilon_{44}$, 8 → ϵ_8 ,
9 → $\epsilon_4 \epsilon_{10}$, 10 → ϵ_{10} , 11 → $\epsilon_4 \epsilon_{10} \epsilon_{44}$, 12 → ϵ_{10} , 13 → $\epsilon_4 \epsilon_{10} \epsilon_{44}$, 14 → $-\epsilon_4 \epsilon_{10}$, 15 → $-\epsilon_4 \epsilon_{10}$,
16 → $-\epsilon_4 \epsilon_8 \epsilon_{10}$, 17 → $\epsilon_4 \epsilon_{44}$, 18 → 1, 19 → $\frac{1}{\epsilon_4}$, 20 → 1, 21 → $\frac{1}{\epsilon_4}$, 22 → 1, 23 → 1,
24 → 1, 25 → 1, 26 → $\epsilon_4 \epsilon_{44}$, 27 → $\frac{1}{\epsilon_4}$, 28 → 1, 29 → $\frac{1}{\epsilon_4}$, 30 → 1, 31 → ϵ_{10} , 32 → 1,
33 → 1, 34 → $\epsilon_4 \epsilon_{10}$, 35 → 1, 36 → 1, 37 → 1, 38 → 1, 39 → ϵ_{39} , 40 → ϵ_{44} , 41 → ϵ_{44} ,
42 → ϵ_{44} , 43 → ϵ_{39} , 44 → ϵ_{44} , 45 → $\epsilon_4 \epsilon_{10} \epsilon_{44}$, 46 → $\epsilon_4 \epsilon_{10} \epsilon_{44}$, 47 → $\epsilon_4 \epsilon_{10} \epsilon_{44}$, 48 → ϵ_4 }

```

DeleteCases [
  {1 →  $\epsilon_4 \epsilon_{10}$ , 2 →  $\epsilon_4 \epsilon_{10}$ , 3 →  $-\epsilon_4 \epsilon_{10}$ , 4 →  $\epsilon_4$ , 5 →  $\epsilon_5$ , 6 →  $\epsilon_6$ , 7 →  $\epsilon_4 \epsilon_8 \epsilon_{10} \epsilon_{44}$ , 8 →  $\epsilon_8$ , 9 →  $\epsilon_4 \epsilon_{10}$ ,
  10 →  $\epsilon_{10}$ , 11 →  $\epsilon_4 \epsilon_{10} \epsilon_{44}$ , 12 →  $\epsilon_{10}$ , 13 →  $\epsilon_4 \epsilon_{10} \epsilon_{44}$ , 14 →  $-\epsilon_4 \epsilon_{10}$ , 15 →  $-\epsilon_4 \epsilon_{10}$ ,
  16 →  $-\epsilon_4 \epsilon_8 \epsilon_{10}$ , 17 →  $\epsilon_4 \epsilon_{44}$ , 18 → 1, 19 →  $\frac{1}{\epsilon_4}$ , 20 → 1, 21 →  $\frac{1}{\epsilon_4}$ , 22 → 1, 23 → 1, 24 → 1,
  25 → 1, 26 →  $\epsilon_4 \epsilon_{44}$ , 27 →  $\frac{1}{\epsilon_4}$ , 28 → 1, 29 →  $\frac{1}{\epsilon_4}$ , 30 → 1, 31 →  $\epsilon_{10}$ , 32 → 1, 33 → 1,
  34 →  $\epsilon_4 \epsilon_{10}$ , 35 → 1, 36 → 1, 37 → 1, 38 → 1, 39 →  $\epsilon_{39}$ , 40 →  $\epsilon_{44}$ , 41 →  $\epsilon_{44}$ , 42 →  $\epsilon_{44}$ , 43 →  $\epsilon_{39}$ ,
  44 →  $\epsilon_{44}$ , 45 →  $\epsilon_4 \epsilon_{10} \epsilon_{44}$ , 46 →  $\epsilon_4 \epsilon_{10} \epsilon_{44}$ , 47 →  $\epsilon_4 \epsilon_{10} \epsilon_{44}$ , 48 →  $\epsilon_4$ } /.  $\epsilon_{\_} \rightarrow 1, \_ \rightarrow 1$ ]
{3 → -1, 14 → -1, 15 → -1, 16 → -1}

```