

Pensieve header: Formula testing for the future double-tree paper; continued pensieve://2013-11/.

Double-Tree Formula Testing

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2013-10"];
```

```
<< "../2013-05/FreeLie.m"
```

```
<< "../2013-05/muCalculus.m"
```

```
<< "WKOSolution8-0.m"
```

```
 $\alpha$  = MakeLieSeries[{"1", "2"},  $\alpha$ ];  $\beta$  = MakeLieSeries[{"1", "2"},  $\beta$ ];
```

```
 $\gamma$  = MakeCWSeries[{"1", "2"},  $\gamma$ ];
```

```
V = M[{1  $\rightarrow$   $\alpha$ , 2  $\rightarrow$   $\beta$ },  $\gamma$ ];
```

```
 $\kappa$ s[d_, 1] := If[OddQ[d], 0,  $\kappa$ s[d]];  $\kappa$  = MakeCWSeries[{"1"},  $\kappa$ s];
```

```
Unprotect[C]; C = M[{1  $\rightarrow$  MakeLieSeries[0]},  $\kappa$ ];
```

```
$SeriesShowDegree = 5; $SeriesCompareDegree = 8;
```

```
{V, C // dc[1]}
```

$$\left\{ M \left[\left\{ 1 \rightarrow \text{LS} \left[0, -\frac{\overline{12}}{24}, 0, \frac{\overline{71112}}{5760} - \frac{\overline{71122}}{5760} + \frac{\overline{1222}}{1440}, 0 \right], 2 \rightarrow \right. \right.$$

$$\left. \text{LS} \left[\frac{\overline{1}}{2}, -\frac{\overline{12}}{12}, 0, \frac{\overline{11112}}{5760} - \frac{1}{720} \frac{\overline{1122}}{1222} + \frac{1}{720} \frac{\overline{1222}}{1222}, -\frac{\overline{11112}}{7680} + \frac{\overline{11122}}{3840} - \frac{\overline{11212}}{6912} \right] \right\},$$

$$\text{CWS} \left[0, -\frac{\overline{12}}{48}, 0, \frac{\overline{1112}}{2880} + \frac{\overline{1122}}{2880} + \frac{\overline{1212}}{5760} + \frac{\overline{1222}}{2880}, 0 \right], M \left[\{\}, \text{CWS} \left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11520}, 0 \right] \right] \right\}$$

1. The Hard R4 Equation

```
R+[2, 3] ** R+[1, 3] ** V  $\equiv$  V ** (R+[1, 3] // d $\Delta$ [1, 1, 2])
```

```
True
```

2. The Twist Equation

```
V **  $\Theta$ [1, 2]  $\equiv$  R+[1, 2] ** (V // d $\sigma$ [{1, 2}  $\rightarrow$  {2, 1}])
```

```
True
```

3. The Unitarity Equation

```
V ** (V // dA[1] // dA[2])  $\equiv$  de[1]  $\cup$  de[2]
```

```
True
```

4. The Cap Equation

```
(V ** (C // d $\Delta$ [1, 1, 2]) // dc[1] // dc[2])  $\equiv$  (C  $\cup$  (C // d $\sigma$ [1, 2]) // dc[1] // dc[2])
```

```
True
```

5. The Vertical Flip Equation

```
V ** (V // ds[1] // ds[2])  $\equiv$  R+[1, 2]
```

```
True
```