

Pensieve header: km with up to 15 inputs; CF based on CoefficientRules.

```

In[ ]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\SL2Invariant"];
<< SL2Invariant.m

Loading KnotTheory` version of January 20, 2015, 10:42:19.1122.
Read more at http://katlas.org/wiki/KnotTheory.

This is Profile.m of http://www.drorbn.net/AcademicPensieve/Projects/Profile/.

This version: June 2018. Original version: July 1994.

In[ ]:= CCF[ $\mathcal{E}_-$ ] := PP_CCF@Expand[PP_Exp[
  Expand[ $\mathcal{E}$ ] /. {ex- ey- -> ex+y /. ex- -> eCCF[x] }]];
CF[ $\mathcal{E}_-$ List] := CF /@  $\mathcal{E}$ ;
CF[ $\mathcal{E}_-$ ] := PP_CCF@Module[
  {vs = Cases[ $\mathcal{E}$ , {y | b | t | a | x |  $\eta$  |  $\beta$  |  $\tau$  |  $\alpha$  |  $\xi$ }_ ,  $\infty$ ] U {y, b, t, a, x,  $\eta$ ,  $\beta$ ,  $\tau$ ,  $\alpha$ ,  $\xi$ },
  Total[CoefficientRules[Expand[ $\mathcal{E}$ ], vs] /. {ps_ -> c_} -> CCF[c] (Times@@vsps)
];

In[ ]:= $k = 1; Clear[km];

In[ ]:= km[1] = IE_{1} -> {1} [a1  $\alpha_1$  + t  $\tau_1$ , x1  $\xi_1$  + y1  $\eta_1$ , 1];
km[n_Integer] /; n > 1 := km[n] = km[n-1] // km1,n-1

```

In[*]:= km[4]

$$\begin{aligned}
\text{Out[*]} = & E_{\{1,2,3,4\} \rightarrow \{1\}} \left[\mathbf{a}_1 \alpha_1 + \mathbf{a}_1 \alpha_2 + \mathbf{a}_1 \alpha_3 + \mathbf{a}_1 \alpha_4 + \mathbf{t} \tau_1 + \mathbf{t} \tau_2 + \mathbf{t} \tau_3 + \mathbf{t} \tau_4, \mathbf{y}_1 \eta_1 + \frac{\mathbf{y}_1 \eta_2}{\mathcal{A}_1} + \frac{\mathbf{y}_1 \eta_3}{\mathcal{A}_1 \mathcal{A}_2} + \right. \\
& \frac{\mathbf{y}_1 \eta_4}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3} + \frac{\mathbf{x}_1 \xi_1}{\mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} + \left(\frac{1}{\hbar} - \frac{\mathbf{T}}{\hbar} \right) \eta_2 \xi_1 + \left(\frac{1}{\hbar \mathcal{A}_2} - \frac{\mathbf{T}}{\hbar \mathcal{A}_2} \right) \eta_3 \xi_1 + \left(\frac{1}{\hbar \mathcal{A}_2 \mathcal{A}_3} - \frac{\mathbf{T}}{\hbar \mathcal{A}_2 \mathcal{A}_3} \right) \eta_4 \xi_1 + \\
& \frac{\mathbf{x}_1 \xi_2}{\mathcal{A}_3 \mathcal{A}_4} + \left(\frac{1}{\hbar} - \frac{\mathbf{T}}{\hbar} \right) \eta_3 \xi_2 + \left(\frac{1}{\hbar \mathcal{A}_3} - \frac{\mathbf{T}}{\hbar \mathcal{A}_3} \right) \eta_4 \xi_2 + \frac{\mathbf{x}_1 \xi_3}{\mathcal{A}_4} + \left(\frac{1}{\hbar} - \frac{\mathbf{T}}{\hbar} \right) \eta_4 \xi_3 + \mathbf{x}_1 \xi_4, \\
& 1 + \left(2 \mathbf{T} \mathbf{a}_1 \eta_2 \xi_1 + \frac{\gamma \hbar \mathbf{x}_1 \mathbf{y}_1 \eta_2 \xi_1}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} + \mathbf{y}_1 \left(\frac{\gamma}{2 \mathcal{A}_1} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_1} \right) \eta_2^2 \xi_1 + \frac{2 \mathbf{T} \mathbf{a}_1 \eta_3 \xi_1}{\mathcal{A}_2} + \frac{\gamma \hbar \mathbf{x}_1 \mathbf{y}_1 \eta_3 \xi_1}{\mathcal{A}_1 \mathcal{A}_2^2 \mathcal{A}_3 \mathcal{A}_4} + \right. \\
& \mathbf{y}_1 \left(\frac{\gamma}{\mathcal{A}_1 \mathcal{A}_2} - \frac{3 \mathbf{T} \gamma}{\mathcal{A}_1 \mathcal{A}_2} \right) \eta_2 \eta_3 \xi_1 + \mathbf{y}_1 \left(\frac{\gamma}{2 \mathcal{A}_1 \mathcal{A}_2^2} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_1 \mathcal{A}_2^2} \right) \eta_3^2 \xi_1 + \frac{2 \mathbf{T} \mathbf{a}_1 \eta_4 \xi_1}{\mathcal{A}_2 \mathcal{A}_3} + \\
& \frac{\gamma \hbar \mathbf{x}_1 \mathbf{y}_1 \eta_4 \xi_1}{\mathcal{A}_1 \mathcal{A}_2^2 \mathcal{A}_3 \mathcal{A}_4} + \mathbf{y}_1 \left(\frac{\gamma}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3} - \frac{3 \mathbf{T} \gamma}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3} \right) \eta_2 \eta_4 \xi_1 + \mathbf{y}_1 \left(\frac{\gamma}{\mathcal{A}_1 \mathcal{A}_2^2 \mathcal{A}_3} - \frac{3 \mathbf{T} \gamma}{\mathcal{A}_1 \mathcal{A}_2^2 \mathcal{A}_3} \right) \eta_3 \eta_4 \xi_1 + \\
& \mathbf{y}_1 \left(\frac{\gamma}{2 \mathcal{A}_1 \mathcal{A}_2^2 \mathcal{A}_3^2} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_1 \mathcal{A}_2^2 \mathcal{A}_3^2} \right) \eta_4^2 \xi_1 + \mathbf{x}_1 \left(\frac{\gamma}{2 \mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} \right) \eta_2 \xi_1^2 + \left(\frac{\gamma}{4 \hbar} - \frac{\mathbf{T} \gamma}{\hbar} + \frac{3 \mathbf{T}^2 \gamma}{4 \hbar} \right) \eta_2^2 \xi_1^2 + \\
& \mathbf{x}_1 \left(\frac{\gamma}{2 \mathcal{A}_2^2 \mathcal{A}_3 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_2^2 \mathcal{A}_3 \mathcal{A}_4} \right) \eta_3 \xi_1^2 + \left(\frac{\gamma}{2 \hbar \mathcal{A}_2} - \frac{2 \mathbf{T} \gamma}{\hbar \mathcal{A}_2} + \frac{3 \mathbf{T}^2 \gamma}{2 \hbar \mathcal{A}_2} \right) \eta_2 \eta_3 \xi_1^2 + \\
& \left(\frac{\gamma}{4 \hbar \mathcal{A}_2^2} - \frac{\mathbf{T} \gamma}{\hbar \mathcal{A}_2^2} + \frac{3 \mathbf{T}^2 \gamma}{4 \hbar \mathcal{A}_2^2} \right) \eta_3^2 \xi_1^2 + \mathbf{x}_1 \left(\frac{\gamma}{2 \mathcal{A}_2^2 \mathcal{A}_3^2 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_2^2 \mathcal{A}_3^2 \mathcal{A}_4} \right) \eta_4 \xi_1^2 + \\
& \left(\frac{\gamma}{2 \hbar \mathcal{A}_2 \mathcal{A}_3} - \frac{2 \mathbf{T} \gamma}{\hbar \mathcal{A}_2 \mathcal{A}_3} + \frac{3 \mathbf{T}^2 \gamma}{2 \hbar \mathcal{A}_2 \mathcal{A}_3} \right) \eta_2 \eta_4 \xi_1^2 + \left(\frac{\gamma}{2 \hbar \mathcal{A}_2^2 \mathcal{A}_3} - \frac{2 \mathbf{T} \gamma}{\hbar \mathcal{A}_2^2 \mathcal{A}_3} + \frac{3 \mathbf{T}^2 \gamma}{2 \hbar \mathcal{A}_2^2 \mathcal{A}_3} \right) \eta_3 \eta_4 \xi_1^2 + \\
& \left(\frac{\gamma}{4 \hbar \mathcal{A}_2^2 \mathcal{A}_3^2} - \frac{\mathbf{T} \gamma}{\hbar \mathcal{A}_2^2 \mathcal{A}_3^2} + \frac{3 \mathbf{T}^2 \gamma}{4 \hbar \mathcal{A}_2^2 \mathcal{A}_3^2} \right) \eta_4^2 \xi_1^2 + 2 \mathbf{T} \mathbf{a}_1 \eta_3 \xi_2 + \frac{\gamma \hbar \mathbf{x}_1 \mathbf{y}_1 \eta_3 \xi_2}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} + \\
& \mathbf{y}_1 \left(\frac{\gamma}{2 \mathcal{A}_1 \mathcal{A}_2} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_1 \mathcal{A}_2} \right) \eta_3^2 \xi_2 + \frac{2 \mathbf{T} \mathbf{a}_1 \eta_4 \xi_2}{\mathcal{A}_3} + \frac{\gamma \hbar \mathbf{x}_1 \mathbf{y}_1 \eta_4 \xi_2}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3^2 \mathcal{A}_4} + \mathbf{y}_1 \left(\frac{\gamma}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3} - \frac{3 \mathbf{T} \gamma}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3} \right) \eta_3 \eta_4 \xi_2 + \\
& \mathbf{y}_1 \left(\frac{\gamma}{2 \mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3^2} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3^2} \right) \eta_4^2 \xi_2 + \mathbf{x}_1 \left(\frac{\gamma}{\mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{\mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} \right) \eta_3 \xi_1 \xi_2 + \\
& \left(\frac{\gamma}{2 \hbar \mathcal{A}_2} - \frac{2 \mathbf{T} \gamma}{\hbar \mathcal{A}_2} + \frac{3 \mathbf{T}^2 \gamma}{2 \hbar \mathcal{A}_2} \right) \eta_3^2 \xi_1 \xi_2 + \mathbf{x}_1 \left(\frac{\gamma}{\mathcal{A}_2 \mathcal{A}_3^2 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{\mathcal{A}_2 \mathcal{A}_3^2 \mathcal{A}_4} \right) \eta_4 \xi_1 \xi_2 + \\
& \left(\frac{\gamma}{\hbar \mathcal{A}_2 \mathcal{A}_3} - \frac{4 \mathbf{T} \gamma}{\hbar \mathcal{A}_2 \mathcal{A}_3} + \frac{3 \mathbf{T}^2 \gamma}{\hbar \mathcal{A}_2 \mathcal{A}_3} \right) \eta_3 \eta_4 \xi_1 \xi_2 + \left(\frac{\gamma}{2 \hbar \mathcal{A}_2 \mathcal{A}_3^2} - \frac{2 \mathbf{T} \gamma}{\hbar \mathcal{A}_2 \mathcal{A}_3^2} + \frac{3 \mathbf{T}^2 \gamma}{2 \hbar \mathcal{A}_2 \mathcal{A}_3^2} \right) \eta_4^2 \xi_1 \xi_2 + \\
& \mathbf{x}_1 \left(\frac{\gamma}{2 \mathcal{A}_3 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_3 \mathcal{A}_4} \right) \eta_3 \xi_2^2 + \left(\frac{\gamma}{4 \hbar} - \frac{\mathbf{T} \gamma}{\hbar} + \frac{3 \mathbf{T}^2 \gamma}{4 \hbar} \right) \eta_3^2 \xi_2^2 + \mathbf{x}_1 \left(\frac{\gamma}{2 \mathcal{A}_3^2 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_3^2 \mathcal{A}_4} \right) \eta_4 \xi_2^2 + \\
& \left(\frac{\gamma}{2 \hbar \mathcal{A}_3} - \frac{2 \mathbf{T} \gamma}{\hbar \mathcal{A}_3} + \frac{3 \mathbf{T}^2 \gamma}{2 \hbar \mathcal{A}_3} \right) \eta_3 \eta_4 \xi_2^2 + \left(\frac{\gamma}{4 \hbar \mathcal{A}_3^2} - \frac{\mathbf{T} \gamma}{\hbar \mathcal{A}_3^2} + \frac{3 \mathbf{T}^2 \gamma}{4 \hbar \mathcal{A}_3^2} \right) \eta_4^2 \xi_2^2 + 2 \mathbf{T} \mathbf{a}_1 \eta_4 \xi_3 + \\
& \frac{\gamma \hbar \mathbf{x}_1 \mathbf{y}_1 \eta_4 \xi_3}{\mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} + \mathbf{y}_1 \left(\frac{\gamma}{2 \mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_1 \mathcal{A}_2 \mathcal{A}_3} \right) \eta_4^2 \xi_3 + \mathbf{x}_1 \left(\frac{\gamma}{\mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{\mathcal{A}_2 \mathcal{A}_3 \mathcal{A}_4} \right) \eta_4 \xi_1 \xi_3 + \\
& \left(\frac{\gamma}{2 \hbar \mathcal{A}_2 \mathcal{A}_3} - \frac{2 \mathbf{T} \gamma}{\hbar \mathcal{A}_2 \mathcal{A}_3} + \frac{3 \mathbf{T}^2 \gamma}{2 \hbar \mathcal{A}_2 \mathcal{A}_3} \right) \eta_4^2 \xi_1 \xi_3 + \mathbf{x}_1 \left(\frac{\gamma}{\mathcal{A}_3 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{\mathcal{A}_3 \mathcal{A}_4} \right) \eta_4 \xi_2 \xi_3 + \\
& \left. \left(\frac{\gamma}{2 \hbar \mathcal{A}_3} - \frac{2 \mathbf{T} \gamma}{\hbar \mathcal{A}_3} + \frac{3 \mathbf{T}^2 \gamma}{2 \hbar \mathcal{A}_3} \right) \eta_4^2 \xi_2 \xi_3 + \mathbf{x}_1 \left(\frac{\gamma}{2 \mathcal{A}_4} - \frac{3 \mathbf{T} \gamma}{2 \mathcal{A}_4} \right) \eta_4 \xi_3^2 + \left(\frac{\gamma}{4 \hbar} - \frac{\mathbf{T} \gamma}{\hbar} + \frac{3 \mathbf{T}^2 \gamma}{4 \hbar} \right) \eta_4^2 \xi_3^2 \right) \epsilon + \mathbf{O}[\epsilon]^2
\end{aligned}$$

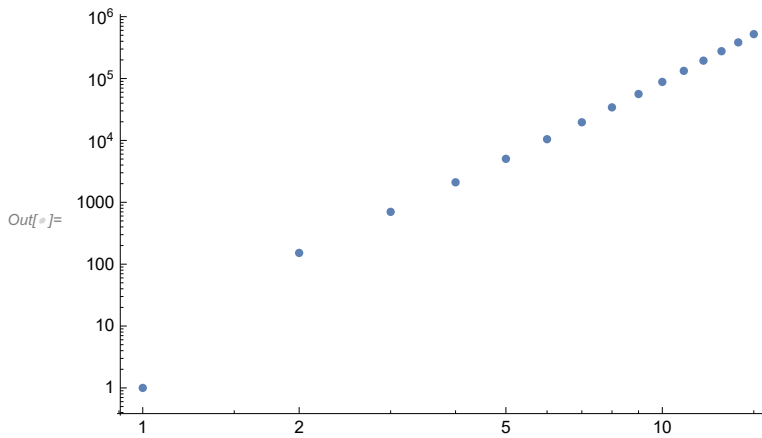
```
In[ ]:= Table[Echo[Prepend[LeafCount /@ List @@ km[n], n]], {n, 15}] // MatrixForm
```

```
" {1, 13, 15, 1}
" {2, 25, 56, 152}
" {3, 37, 135, 701}
" {4, 49, 262, 2104}
" {5, 61, 447, 5039}
" {6, 73, 700, 10459}
" {7, 85, 1031, 19637}
" {8, 97, 1450, 34211}
" {9, 109, 1967, 56229}
" {10, 121, 2592, 88194}
" {11, 133, 3335, 133109}
" {12, 145, 4206, 194522}
" {13, 157, 5215, 276571}
" {14, 169, 6372, 384029}
" {15, 181, 7687, 522349}
```

```
Out[ ]//MatrixForm=
```

```
( 1 13 15 1
  2 25 56 152
  3 37 135 701
  4 49 262 2104
  5 61 447 5039
  6 73 700 10459
  7 85 1031 19637
  8 97 1450 34211
  9 109 1967 56229
 10 121 2592 88194
 11 133 3335 133109
 12 145 4206 194522
 13 157 5215 276571
 14 169 6372 384029
 15 181 7687 522349)
```

```
In[ ]:= ListLogLogPlot[Table[LeafCount[km[n][3]], {n, 15}]]
```



```
In[ ]:= N@Table[Log@LeafCount[km[n][3]] / Log[n], {n, 2, 15}]
```

```
Out[ ]:= {7.24793, 5.96435, 5.51946, 5.29686, 5.16544, 5.07997,
          5.02072, 4.97773, 4.94544, 4.92053, 4.90091, 4.88517, 4.87237, 4.86183}
```

In[]:= **PrintProfile** []

```

Out[ ]:= ProfileRoot is root. Profiled time: 234.094
  ( 15) 0.688/ 231.950 above B
  ( 1) 0.016/ 2.141 above Boot[1]
CF: called 1272 times, time in 86.437/95.955
  ( 240) 55.573/ 62.954 under LZip
  ( 1032) 30.864/ 33.001 under QZip
  ( 31484) 2.313/ 9.518 above CCF
LZip: called 31 times, time in 59.362/125.051
  ( 31) 59.362/ 125.050 under B
  ( 240) 55.573/ 62.954 above CF
  ( 30) 0.656/ 2.735 above Zip
QZip: called 30 times, time in 42.089/108.292
  ( 30) 42.089/ 108.290 under B
  ( 1032) 30.864/ 33.001 above CF
  ( 30) 26.219/ 33.202 above Zip
Zip: called 235 times, time in 29./40.933
  ( 30) 0.656/ 2.735 under LZip
  ( 30) 26.219/ 33.202 under QZip
  ( 175) 2.125/ 4.996 under Zip
  ( 235) 6.937/ 6.937 above Collect
  ( 175) 2.125/ 4.996 above Zip
Collect: called 235 times, time in 6.937/6.937
  ( 235) 6.937/ 6.937 under Zip
Exp: called 59820 times, time in 6.209/8.596
  ( 59820) 6.209/ 8.596 under CCF
  ( 28336) 0.996/ 2.387 above CCF
CCF: called 59820 times, time in 3.309/11.905
  ( 31484) 2.313/ 9.518 under CF
  ( 28336) 0.996/ 2.387 under Exp
  ( 59820) 6.209/ 8.596 above Exp
B: called 31 times, time in 0.688/234.031
  ( 15) 0.688/ 231.950 under ProfileRoot
  ( 16) 0/ 2.078 under Boot[1]
  ( 31) 59.362/ 125.050 above LZip
  ( 30) 42.089/ 108.290 above QZip
Boot[1]: called 13 times, time in 0.063/5.249
  ( 1) 0.016/ 2.141 under ProfileRoot
  ( 12) 0.047/ 3.108 under Boot[1]
  ( 16) 0/ 2.078 above B
  ( 3) 0/ 0 above Boot[0]
  ( 12) 0.047/ 3.108 above Boot[1]
Boot[0]: called 3 times, time in 0./0.
  ( 3) 0/ 0 under Boot[1]

```

The Trefoil

```
In[*]:= Timing@Block[{$k = 1},
  Z = R1,5 R6,2 R3,7 C4 Kink8 Kink9 Kink10;
  Do[Z = Z ~ B1,r ~ dm1,r→1, {r, 2, 10}];
  {Simplify /@ Z, Simplify /@ (Z ~ B1 ~ b2t1 /. T1 → T)}]
```

$$\text{Out[*]} = \left\{ 18.1406, \left\{ \mathbb{E}_{\{\} \rightarrow \{1\}} \left[\theta, \theta, \frac{B_1}{1 - B_1 + B_1^2} - \frac{1}{(1 - B_1 + B_1^2)^3} \hbar B_1 \left(-a_1 \left(-1 + B_1 - B_1^3 + B_1^4 \right) + \gamma \left(B_1 - 2 B_1^2 - 2 B_1^4 + 2 \hbar x_1 y_1 + B_1^3 \left(3 + 2 \hbar x_1 y_1 \right) \right) \right) \right] \in + \right. \right.$$

$$\left. O[\epsilon]^2 \right\}, \mathbb{E}_{\{\} \rightarrow \{1\}} \left[\theta, \theta, \frac{T}{1 - T + T^2} + \frac{1}{(1 - T + T^2)^3} T \hbar \left(T \left(-1 + 2 T - 3 T^2 + 2 T^3 \right) \gamma + 2 \left(-1 + T - T^3 + T^4 \right) a_1 - 2 \left(1 + T^3 \right) \gamma \hbar x_1 y_1 \right) \right] \in + O[\epsilon]^2 \right\}$$

```
In[*]:= Timing@Block[{$k = 1},
  Z = kR1,5 kR6,2 kR3,7 kC4 kKink8 kKink9 kKink10;
  Do[Z = Z ~ B1,r ~ km1,r→1, {r, 2, 10}];
  Simplify /@ Z]
```

$$\text{Out[*]} = \left\{ 9.67188, \mathbb{E}_{\{\} \rightarrow \{1\}} \left[\theta, \theta, \frac{T}{1 - T + T^2} + \frac{1}{(1 - T + T^2)^3} T \hbar \left(T \left(-1 + 2 T - 3 T^2 + 2 T^3 \right) \gamma + 2 \left(-1 + T - T^3 + T^4 \right) a_1 - 2 \left(1 + T^3 \right) \gamma \hbar x_1 y_1 \right) \right] \in + O[\epsilon]^2 \right\}$$

```
In[*]:= Z@Knot[10, 100]
```

... Part: The expression Knot[10, 100] cannot be used as a part specification.

$$\text{Out[*]} = \left\{ \theta, \left(-\hbar - T^2 \hbar + \frac{\hbar}{1 - T + T^2} - \frac{T \hbar}{1 - T + T^2} + \frac{2 T^2 \hbar}{1 - T + T^2} - \frac{T^3 \hbar}{1 - T + T^2} + \frac{T^4 \hbar}{1 - T + T^2} \right) x_1 y_1, \right.$$

$$\left(\frac{T}{(1 - T + T^2)^3} - \frac{2 T^2}{(1 - T + T^2)^3} + \frac{3 T^3}{(1 - T + T^2)^3} - \frac{2 T^4}{(1 - T + T^2)^3} + \frac{T^5}{(1 - T + T^2)^3} \right) +$$

$$\left(-\frac{T^4 \gamma \hbar}{(1 - T + T^2)^5} + \frac{3 T^5 \gamma \hbar}{(1 - T + T^2)^5} - \frac{5 T^6 \gamma \hbar}{(1 - T + T^2)^5} + \frac{5 T^7 \gamma \hbar}{(1 - T + T^2)^5} - \frac{3 T^8 \gamma \hbar}{(1 - T + T^2)^5} + \frac{T^9 \gamma \hbar}{(1 - T + T^2)^5} - \right.$$

$$\frac{T^2 \gamma \hbar}{(1 - T + T^2)^4} + \frac{3 T^3 \gamma \hbar}{(1 - T + T^2)^4} - \frac{5 T^4 \gamma \hbar}{(1 - T + T^2)^4} + \frac{5 T^5 \gamma \hbar}{(1 - T + T^2)^4} - \frac{3 T^6 \gamma \hbar}{(1 - T + T^2)^4} + \frac{T^7 \gamma \hbar}{(1 - T + T^2)^4} +$$

$$\left(-\frac{2 T^2 \hbar}{(1 - T + T^2)^4} + \frac{8 T^3 \hbar}{(1 - T + T^2)^4} - \frac{14 T^4 \hbar}{(1 - T + T^2)^4} + \frac{16 T^5 \hbar}{(1 - T + T^2)^4} - \frac{10 T^6 \hbar}{(1 - T + T^2)^4} + \frac{4 T^7 \hbar}{(1 - T + T^2)^4} - \right.$$

$$\frac{2 T \hbar}{(1 - T + T^2)^3} + \frac{4 T^2 \hbar}{(1 - T + T^2)^3} - \frac{6 T^3 \hbar}{(1 - T + T^2)^3} + \frac{4 T^4 \hbar}{(1 - T + T^2)^3} - \frac{2 T^5 \hbar}{(1 - T + T^2)^3} \Big) a_1 +$$

$$\left(\frac{T^2 \gamma \hbar^2}{(1 - T + T^2)^6} - \frac{8 T^3 \gamma \hbar^2}{(1 - T + T^2)^6} + \frac{26 T^4 \gamma \hbar^2}{(1 - T + T^2)^6} - \frac{53 T^5 \gamma \hbar^2}{(1 - T + T^2)^6} + \frac{71 T^6 \gamma \hbar^2}{(1 - T + T^2)^6} - \right.$$

$$\frac{62 T^7 \gamma \hbar^2}{(1 - T + T^2)^6} + \frac{26 T^8 \gamma \hbar^2}{(1 - T + T^2)^6} + \frac{13 T^9 \gamma \hbar^2}{(1 - T + T^2)^6} - \frac{31 T^{10} \gamma \hbar^2}{(1 - T + T^2)^6} + \frac{26 T^{11} \gamma \hbar^2}{(1 - T + T^2)^6} - \frac{12 T^{12} \gamma \hbar^2}{(1 - T + T^2)^6} +$$

$$\left. \frac{3 T^{13} \gamma \hbar^2}{(1 - T + T^2)^6} - \frac{T^2 \gamma \hbar^2}{(1 - T + T^2)^5} + \frac{5 T^3 \gamma \hbar^2}{(1 - T + T^2)^5} - \frac{10 T^4 \gamma \hbar^2}{(1 - T + T^2)^5} + \frac{5 T^5 \gamma \hbar^2}{(1 - T + T^2)^5} + \frac{16 T^6 \gamma \hbar^2}{(1 - T + T^2)^5} - \right.$$

$$\begin{aligned}
 & \frac{47 T^7 \gamma \hbar^2}{(1-T+T^2)^5} + \frac{61 T^8 \gamma \hbar^2}{(1-T+T^2)^5} - \frac{52 T^9 \gamma \hbar^2}{(1-T+T^2)^5} + \frac{26 T^{10} \gamma \hbar^2}{(1-T+T^2)^5} - \frac{8 T^{11} \gamma \hbar^2}{(1-T+T^2)^5} - \\
 & \frac{2 T^2 \gamma \hbar^2}{(1-T+T^2)^4} + \frac{8 T^3 \gamma \hbar^2}{(1-T+T^2)^4} - \frac{16 T^4 \gamma \hbar^2}{(1-T+T^2)^4} + \frac{27 T^5 \gamma \hbar^2}{(1-T+T^2)^4} - \frac{30 T^6 \gamma \hbar^2}{(1-T+T^2)^4} + \\
 & \frac{29 T^7 \gamma \hbar^2}{(1-T+T^2)^4} - \frac{16 T^8 \gamma \hbar^2}{(1-T+T^2)^4} + \frac{7 T^9 \gamma \hbar^2}{(1-T+T^2)^4} - \frac{2 T \gamma \hbar^2}{(1-T+T^2)^3} + \frac{2 T^2 \gamma \hbar^2}{(1-T+T^2)^3} - \\
 & \frac{4 T^3 \gamma \hbar^2}{(1-T+T^2)^3} + \frac{2 T^4 \gamma \hbar^2}{(1-T+T^2)^3} - \frac{4 T^5 \gamma \hbar^2}{(1-T+T^2)^3} + \frac{2 T^6 \gamma \hbar^2}{(1-T+T^2)^3} - \frac{2 T^7 \gamma \hbar^2}{(1-T+T^2)^3} \Big) x_1 y_1 + \\
 & \left(\frac{2 T^3 \hbar^2}{(1-T+T^2)^5} - \frac{8 T^4 \hbar^2}{(1-T+T^2)^5} + \frac{20 T^5 \hbar^2}{(1-T+T^2)^5} - \frac{32 T^6 \hbar^2}{(1-T+T^2)^5} + \frac{38 T^7 \hbar^2}{(1-T+T^2)^5} - \right. \\
 & \frac{32 T^8 \hbar^2}{(1-T+T^2)^5} + \frac{20 T^9 \hbar^2}{(1-T+T^2)^5} - \frac{8 T^{10} \hbar^2}{(1-T+T^2)^5} + \frac{2 T^{11} \hbar^2}{(1-T+T^2)^5} - \frac{6 T^3 \hbar^2}{(1-T+T^2)^4} + \frac{18 T^4 \hbar^2}{(1-T+T^2)^4} - \\
 & \frac{36 T^5 \hbar^2}{(1-T+T^2)^4} + \frac{42 T^6 \hbar^2}{(1-T+T^2)^4} - \frac{36 T^7 \hbar^2}{(1-T+T^2)^4} + \frac{18 T^8 \hbar^2}{(1-T+T^2)^4} - \frac{6 T^9 \hbar^2}{(1-T+T^2)^4} + \\
 & \left. \frac{4 T^3 \hbar^2}{(1-T+T^2)^3} - \frac{8 T^4 \hbar^2}{(1-T+T^2)^3} + \frac{12 T^5 \hbar^2}{(1-T+T^2)^3} - \frac{8 T^6 \hbar^2}{(1-T+T^2)^3} + \frac{4 T^7 \hbar^2}{(1-T+T^2)^3} \right) a_1 x_1 y_1 + \\
 & \left(\frac{T \gamma \hbar^3}{4 (1-T+T^2)^7} - \frac{2 T^2 \gamma \hbar^3}{(1-T+T^2)^7} + \frac{7 T^3 \gamma \hbar^3}{(1-T+T^2)^7} - \frac{15 T^4 \gamma \hbar^3}{(1-T+T^2)^7} + \frac{19 T^5 \gamma \hbar^3}{(1-T+T^2)^7} - \right. \\
 & \frac{8 T^6 \gamma \hbar^3}{(1-T+T^2)^7} - \frac{47 T^7 \gamma \hbar^3}{2 (1-T+T^2)^7} + \frac{63 T^8 \gamma \hbar^3}{(1-T+T^2)^7} - \frac{345 T^9 \gamma \hbar^3}{4 (1-T+T^2)^7} + \frac{76 T^{10} \gamma \hbar^3}{(1-T+T^2)^7} - \\
 & \frac{79 T^{11} \gamma \hbar^3}{2 (1-T+T^2)^7} + \frac{T^{12} \gamma \hbar^3}{(1-T+T^2)^7} + \frac{39 T^{13} \gamma \hbar^3}{2 (1-T+T^2)^7} - \frac{20 T^{14} \gamma \hbar^3}{(1-T+T^2)^7} + \frac{23 T^{15} \gamma \hbar^3}{2 (1-T+T^2)^7} - \\
 & \frac{4 T^{16} \gamma \hbar^3}{(1-T+T^2)^7} + \frac{3 T^{17} \gamma \hbar^3}{4 (1-T+T^2)^7} + \frac{T^2 \gamma \hbar^3}{2 (1-T+T^2)^6} - \frac{5 T^3 \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{6 T^4 \gamma \hbar^3}{(1-T+T^2)^6} - \\
 & \frac{21 T^5 \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{15 T^6 \gamma \hbar^3}{(1-T+T^2)^6} - \frac{51 T^7 \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{45 T^8 \gamma \hbar^3}{(1-T+T^2)^6} - \frac{147 T^9 \gamma \hbar^3}{2 (1-T+T^2)^6} + \\
 & \frac{93 T^{10} \gamma \hbar^3}{(1-T+T^2)^6} - \frac{185 T^{11} \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{68 T^{12} \gamma \hbar^3}{(1-T+T^2)^6} - \frac{75 T^{13} \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{27 T^{14} \gamma \hbar^3}{2 (1-T+T^2)^6} - \\
 & \frac{3 T^{15} \gamma \hbar^3}{(1-T+T^2)^6} - \frac{T \gamma \hbar^3}{2 (1-T+T^2)^5} + \frac{2 T^2 \gamma \hbar^3}{(1-T+T^2)^5} - \frac{3 T^3 \gamma \hbar^3}{4 (1-T+T^2)^5} - \frac{6 T^4 \gamma \hbar^3}{(1-T+T^2)^5} + \\
 & \frac{27 T^5 \gamma \hbar^3}{(1-T+T^2)^5} - \frac{54 T^6 \gamma \hbar^3}{(1-T+T^2)^5} + \frac{351 T^7 \gamma \hbar^3}{4 (1-T+T^2)^5} - \frac{105 T^8 \gamma \hbar^3}{(1-T+T^2)^5} + \frac{108 T^9 \gamma \hbar^3}{(1-T+T^2)^5} - \\
 & \frac{83 T^{10} \gamma \hbar^3}{(1-T+T^2)^5} + \frac{209 T^{11} \gamma \hbar^3}{4 (1-T+T^2)^5} - \frac{21 T^{12} \gamma \hbar^3}{(1-T+T^2)^5} + \frac{6 T^{13} \gamma \hbar^3}{(1-T+T^2)^5} - \frac{6 T^3 \gamma \hbar^3}{(1-T+T^2)^4} + \\
 & \frac{14 T^4 \gamma \hbar^3}{(1-T+T^2)^4} - \frac{30 T^5 \gamma \hbar^3}{(1-T+T^2)^4} + \frac{36 T^6 \gamma \hbar^3}{(1-T+T^2)^4} - \frac{44 T^7 \gamma \hbar^3}{(1-T+T^2)^4} + \frac{36 T^8 \gamma \hbar^3}{(1-T+T^2)^4} -
 \end{aligned}$$

$$\left(\frac{30 T^9 \gamma \hbar^3}{(1-T+T^2)^4} + \frac{14 T^{10} \gamma \hbar^3}{(1-T+T^2)^4} - \frac{6 T^{11} \gamma \hbar^3}{(1-T+T^2)^4} + \frac{T \gamma \hbar^3}{4(1-T+T^2)^3} - \frac{T^2 \gamma \hbar^3}{2(1-T+T^2)^3} + \frac{15 T^3 \gamma \hbar^3}{4(1-T+T^2)^3} - \frac{9 T^4 \gamma \hbar^3}{2(1-T+T^2)^3} + \frac{15 T^5 \gamma \hbar^3}{2(1-T+T^2)^3} - \frac{9 T^6 \gamma \hbar^3}{2(1-T+T^2)^3} + \frac{23 T^7 \gamma \hbar^3}{4(1-T+T^2)^3} - \frac{5 T^8 \gamma \hbar^3}{2(1-T+T^2)^3} + \frac{9 T^9 \gamma \hbar^3}{4(1-T+T^2)^3} \right) x_1^2 y_1^2 \in + O[\epsilon]^2 \text{ [[Knot[10, 100]]]}$$

In[]:= \$k = 1; Timing@Z@Knot[10, 100]

... Part: The expression Knot[10, 100] cannot be used as a part specification.

$$\text{Out[]:= } \left\{ 0.015625, \left\{ 0, \left(-\hbar - T^2 \hbar + \frac{\hbar}{1-T+T^2} - \frac{T \hbar}{1-T+T^2} + \frac{2 T^2 \hbar}{1-T+T^2} - \frac{T^3 \hbar}{1-T+T^2} + \frac{T^4 \hbar}{1-T+T^2} \right) x_1 y_1, \right. \right. \\ \left(\frac{T}{(1-T+T^2)^3} - \frac{2 T^2}{(1-T+T^2)^3} + \frac{3 T^3}{(1-T+T^2)^3} - \frac{2 T^4}{(1-T+T^2)^3} + \frac{T^5}{(1-T+T^2)^3} \right) + \\ \left(-\frac{T^4 \gamma \hbar}{(1-T+T^2)^5} + \frac{3 T^5 \gamma \hbar}{(1-T+T^2)^5} - \frac{5 T^6 \gamma \hbar}{(1-T+T^2)^5} + \frac{5 T^7 \gamma \hbar}{(1-T+T^2)^5} - \frac{3 T^8 \gamma \hbar}{(1-T+T^2)^5} + \frac{T^9 \gamma \hbar}{(1-T+T^2)^5} - \right. \\ \left. \frac{T^2 \gamma \hbar}{(1-T+T^2)^4} + \frac{3 T^3 \gamma \hbar}{(1-T+T^2)^4} - \frac{5 T^4 \gamma \hbar}{(1-T+T^2)^4} + \frac{5 T^5 \gamma \hbar}{(1-T+T^2)^4} - \frac{3 T^6 \gamma \hbar}{(1-T+T^2)^4} + \frac{T^7 \gamma \hbar}{(1-T+T^2)^4} + \right. \\ \left(-\frac{2 T^2 \hbar}{(1-T+T^2)^4} + \frac{8 T^3 \hbar}{(1-T+T^2)^4} - \frac{14 T^4 \hbar}{(1-T+T^2)^4} + \frac{16 T^5 \hbar}{(1-T+T^2)^4} - \frac{10 T^6 \hbar}{(1-T+T^2)^4} + \frac{4 T^7 \hbar}{(1-T+T^2)^4} - \right. \\ \left. \frac{2 T \hbar}{(1-T+T^2)^3} + \frac{4 T^2 \hbar}{(1-T+T^2)^3} - \frac{6 T^3 \hbar}{(1-T+T^2)^3} + \frac{4 T^4 \hbar}{(1-T+T^2)^3} - \frac{2 T^5 \hbar}{(1-T+T^2)^3} \right) a_1 + \\ \left(\frac{T^2 \gamma \hbar^2}{(1-T+T^2)^6} - \frac{8 T^3 \gamma \hbar^2}{(1-T+T^2)^6} + \frac{26 T^4 \gamma \hbar^2}{(1-T+T^2)^6} - \frac{53 T^5 \gamma \hbar^2}{(1-T+T^2)^6} + \frac{71 T^6 \gamma \hbar^2}{(1-T+T^2)^6} - \right. \\ \frac{62 T^7 \gamma \hbar^2}{(1-T+T^2)^6} + \frac{26 T^8 \gamma \hbar^2}{(1-T+T^2)^6} + \frac{13 T^9 \gamma \hbar^2}{(1-T+T^2)^6} - \frac{31 T^{10} \gamma \hbar^2}{(1-T+T^2)^6} + \frac{26 T^{11} \gamma \hbar^2}{(1-T+T^2)^6} - \frac{12 T^{12} \gamma \hbar^2}{(1-T+T^2)^6} + \\ \frac{3 T^{13} \gamma \hbar^2}{(1-T+T^2)^6} - \frac{T^2 \gamma \hbar^2}{(1-T+T^2)^5} + \frac{5 T^3 \gamma \hbar^2}{(1-T+T^2)^5} - \frac{10 T^4 \gamma \hbar^2}{(1-T+T^2)^5} + \frac{5 T^5 \gamma \hbar^2}{(1-T+T^2)^5} + \frac{16 T^6 \gamma \hbar^2}{(1-T+T^2)^5} - \\ \frac{47 T^7 \gamma \hbar^2}{(1-T+T^2)^5} + \frac{61 T^8 \gamma \hbar^2}{(1-T+T^2)^5} - \frac{52 T^9 \gamma \hbar^2}{(1-T+T^2)^5} + \frac{26 T^{10} \gamma \hbar^2}{(1-T+T^2)^5} - \frac{8 T^{11} \gamma \hbar^2}{(1-T+T^2)^5} - \\ \frac{2 T^2 \gamma \hbar^2}{(1-T+T^2)^4} + \frac{8 T^3 \gamma \hbar^2}{(1-T+T^2)^4} - \frac{16 T^4 \gamma \hbar^2}{(1-T+T^2)^4} + \frac{27 T^5 \gamma \hbar^2}{(1-T+T^2)^4} - \frac{30 T^6 \gamma \hbar^2}{(1-T+T^2)^4} + \\ \frac{29 T^7 \gamma \hbar^2}{(1-T+T^2)^4} - \frac{16 T^8 \gamma \hbar^2}{(1-T+T^2)^4} + \frac{7 T^9 \gamma \hbar^2}{(1-T+T^2)^4} - \frac{2 T \gamma \hbar^2}{(1-T+T^2)^3} + \frac{2 T^2 \gamma \hbar^2}{(1-T+T^2)^3} - \\ \left. \frac{4 T^3 \gamma \hbar^2}{(1-T+T^2)^3} + \frac{2 T^4 \gamma \hbar^2}{(1-T+T^2)^3} - \frac{4 T^5 \gamma \hbar^2}{(1-T+T^2)^3} + \frac{2 T^6 \gamma \hbar^2}{(1-T+T^2)^3} - \frac{2 T^7 \gamma \hbar^2}{(1-T+T^2)^3} \right) x_1 y_1 + \\ \left(\frac{2 T^3 \hbar^2}{(1-T+T^2)^5} - \frac{8 T^4 \hbar^2}{(1-T+T^2)^5} + \frac{20 T^5 \hbar^2}{(1-T+T^2)^5} - \frac{32 T^6 \hbar^2}{(1-T+T^2)^5} + \frac{38 T^7 \hbar^2}{(1-T+T^2)^5} - \right.$$

$$\begin{aligned}
 & \left(\frac{32 T^8 \hbar^2}{(1-T+T^2)^5} + \frac{20 T^9 \hbar^2}{(1-T+T^2)^5} - \frac{8 T^{10} \hbar^2}{(1-T+T^2)^5} + \frac{2 T^{11} \hbar^2}{(1-T+T^2)^5} - \frac{6 T^3 \hbar^2}{(1-T+T^2)^4} + \frac{18 T^4 \hbar^2}{(1-T+T^2)^4} - \right. \\
 & \left. \frac{36 T^5 \hbar^2}{(1-T+T^2)^4} + \frac{42 T^6 \hbar^2}{(1-T+T^2)^4} - \frac{36 T^7 \hbar^2}{(1-T+T^2)^4} + \frac{18 T^8 \hbar^2}{(1-T+T^2)^4} - \frac{6 T^9 \hbar^2}{(1-T+T^2)^4} + \right. \\
 & \left. \frac{4 T^3 \hbar^2}{(1-T+T^2)^3} - \frac{8 T^4 \hbar^2}{(1-T+T^2)^3} + \frac{12 T^5 \hbar^2}{(1-T+T^2)^3} - \frac{8 T^6 \hbar^2}{(1-T+T^2)^3} + \frac{4 T^7 \hbar^2}{(1-T+T^2)^3} \right) a_1 x_1 y_1 + \\
 & \left(\frac{T \gamma \hbar^3}{4 (1-T+T^2)^7} - \frac{2 T^2 \gamma \hbar^3}{(1-T+T^2)^7} + \frac{7 T^3 \gamma \hbar^3}{(1-T+T^2)^7} - \frac{15 T^4 \gamma \hbar^3}{(1-T+T^2)^7} + \frac{19 T^5 \gamma \hbar^3}{(1-T+T^2)^7} - \right. \\
 & \frac{8 T^6 \gamma \hbar^3}{(1-T+T^2)^7} - \frac{47 T^7 \gamma \hbar^3}{2 (1-T+T^2)^7} + \frac{63 T^8 \gamma \hbar^3}{(1-T+T^2)^7} - \frac{345 T^9 \gamma \hbar^3}{4 (1-T+T^2)^7} + \frac{76 T^{10} \gamma \hbar^3}{(1-T+T^2)^7} - \\
 & \frac{79 T^{11} \gamma \hbar^3}{2 (1-T+T^2)^7} + \frac{T^{12} \gamma \hbar^3}{(1-T+T^2)^7} + \frac{39 T^{13} \gamma \hbar^3}{2 (1-T+T^2)^7} - \frac{20 T^{14} \gamma \hbar^3}{(1-T+T^2)^7} + \frac{23 T^{15} \gamma \hbar^3}{2 (1-T+T^2)^7} - \\
 & \frac{4 T^{16} \gamma \hbar^3}{(1-T+T^2)^7} + \frac{3 T^{17} \gamma \hbar^3}{4 (1-T+T^2)^7} + \frac{T^2 \gamma \hbar^3}{2 (1-T+T^2)^6} - \frac{5 T^3 \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{6 T^4 \gamma \hbar^3}{(1-T+T^2)^6} - \\
 & \frac{21 T^5 \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{15 T^6 \gamma \hbar^3}{(1-T+T^2)^6} - \frac{51 T^7 \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{45 T^8 \gamma \hbar^3}{(1-T+T^2)^6} - \frac{147 T^9 \gamma \hbar^3}{2 (1-T+T^2)^6} + \\
 & \frac{93 T^{10} \gamma \hbar^3}{(1-T+T^2)^6} - \frac{185 T^{11} \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{68 T^{12} \gamma \hbar^3}{(1-T+T^2)^6} - \frac{75 T^{13} \gamma \hbar^3}{2 (1-T+T^2)^6} + \frac{27 T^{14} \gamma \hbar^3}{2 (1-T+T^2)^6} - \\
 & \frac{3 T^{15} \gamma \hbar^3}{(1-T+T^2)^6} - \frac{T \gamma \hbar^3}{2 (1-T+T^2)^5} + \frac{2 T^2 \gamma \hbar^3}{(1-T+T^2)^5} - \frac{3 T^3 \gamma \hbar^3}{4 (1-T+T^2)^5} - \frac{6 T^4 \gamma \hbar^3}{(1-T+T^2)^5} + \\
 & \frac{27 T^5 \gamma \hbar^3}{(1-T+T^2)^5} - \frac{54 T^6 \gamma \hbar^3}{(1-T+T^2)^5} + \frac{351 T^7 \gamma \hbar^3}{4 (1-T+T^2)^5} - \frac{105 T^8 \gamma \hbar^3}{(1-T+T^2)^5} + \frac{108 T^9 \gamma \hbar^3}{(1-T+T^2)^5} - \\
 & \frac{83 T^{10} \gamma \hbar^3}{(1-T+T^2)^5} + \frac{209 T^{11} \gamma \hbar^3}{4 (1-T+T^2)^5} - \frac{21 T^{12} \gamma \hbar^3}{(1-T+T^2)^5} + \frac{6 T^{13} \gamma \hbar^3}{(1-T+T^2)^5} - \frac{6 T^3 \gamma \hbar^3}{(1-T+T^2)^4} + \\
 & \frac{14 T^4 \gamma \hbar^3}{(1-T+T^2)^4} - \frac{30 T^5 \gamma \hbar^3}{(1-T+T^2)^4} + \frac{36 T^6 \gamma \hbar^3}{(1-T+T^2)^4} - \frac{44 T^7 \gamma \hbar^3}{(1-T+T^2)^4} + \frac{36 T^8 \gamma \hbar^3}{(1-T+T^2)^4} - \\
 & \frac{30 T^9 \gamma \hbar^3}{(1-T+T^2)^4} + \frac{14 T^{10} \gamma \hbar^3}{(1-T+T^2)^4} - \frac{6 T^{11} \gamma \hbar^3}{(1-T+T^2)^4} + \frac{T \gamma \hbar^3}{4 (1-T+T^2)^3} - \frac{T^2 \gamma \hbar^3}{2 (1-T+T^2)^3} + \\
 & \frac{15 T^3 \gamma \hbar^3}{4 (1-T+T^2)^3} - \frac{9 T^4 \gamma \hbar^3}{2 (1-T+T^2)^3} + \frac{15 T^5 \gamma \hbar^3}{2 (1-T+T^2)^3} - \frac{9 T^6 \gamma \hbar^3}{2 (1-T+T^2)^3} + \frac{23 T^7 \gamma \hbar^3}{4 (1-T+T^2)^3} - \\
 & \left. \frac{5 T^8 \gamma \hbar^3}{2 (1-T+T^2)^3} + \frac{9 T^9 \gamma \hbar^3}{4 (1-T+T^2)^3} \right) x_1^2 y_1^2 \in + O[\epsilon]^2 \{ \text{Knot}[10, 100] \}
 \end{aligned}$$