Pensieve header: km with up to 15 inputs.

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[•]:=
```
$k = 1; Clear[km];
```

In[•]:=
```
km[1] = 𝔼{1}→{1}[a1 α1 + t τ1, x1 ξ1 + y1 η1, 1];
km[n_Integer] /; n > 1 := km[n] = km[n - 1] // km1,n→1
```

In[•]:= **km[4]**

Out[•]=

$$\mathbb{E}_{\{1,2,3,4\}\to\{1\}}\Big[a_1\alpha_1+a_1\alpha_2+a_1\alpha_3+a_1\alpha_4+t\,\tau_1+t\,\tau_2+t\,\tau_3+t\,\tau_4,$$

$$y_1\eta_1+\frac{y_1\eta_2}{\mathcal{A}_1}+\frac{y_1\eta_3}{\mathcal{A}_1\mathcal{A}_2}+\frac{y_1\eta_4}{\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3}+\frac{x_1\xi_1}{\mathcal{A}_2\mathcal{A}_3\mathcal{A}_4}+\frac{(1-T)\,\eta_2\xi_1}{\hbar}+\frac{(1-T)\,\eta_3\xi_1}{\hbar\,\mathcal{A}_2}+$$

$$\frac{(1-T)\,\eta_4\xi_1}{\hbar\,\mathcal{A}_2\mathcal{A}_3}+\frac{x_1\xi_2}{\mathcal{A}_3\mathcal{A}_4}+\frac{(1-T)\,\eta_3\xi_2}{\hbar}+\frac{(1-T)\,\eta_4\xi_2}{\hbar\,\mathcal{A}_3}+\frac{x_1\xi_3}{\mathcal{A}_4}+\frac{(1-T)\,\eta_4\xi_3}{\hbar}+x_1\xi_4,$$

$$1+\Bigg(2\,T\,a_1\eta_2\xi_1+\frac{\gamma\hbar\,x_1y_1\eta_2\xi_1}{\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3\mathcal{A}_4}+\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_2^2\xi_1}{2\,\mathcal{A}_1}+\frac{2\,T\,a_1\eta_3\xi_1}{\mathcal{A}_2}+\frac{\gamma\hbar\,x_1y_1\eta_3\xi_1}{\mathcal{A}_1\mathcal{A}_2^2\mathcal{A}_3\mathcal{A}_4}+$$

$$\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_2\eta_3\xi_1}{\mathcal{A}_1\mathcal{A}_2}+\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_3^2\xi_1}{2\,\mathcal{A}_1\mathcal{A}_2^2}+\frac{2\,T\,a_1\eta_4\xi_1}{\mathcal{A}_2\mathcal{A}_3}+\frac{\gamma\hbar\,x_1y_1\eta_4\xi_1}{\mathcal{A}_1\mathcal{A}_2^2\mathcal{A}_3^2\mathcal{A}_4}+$$

$$\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_2\eta_4\xi_1}{\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3}+\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_3\eta_4\xi_1}{\mathcal{A}_1\mathcal{A}_2^2\mathcal{A}_3}+\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_4^2\xi_1}{2\,\mathcal{A}_1\mathcal{A}_2^2\mathcal{A}_3^2}+\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_2\xi_1^2}{2\,\mathcal{A}_2\mathcal{A}_3\mathcal{A}_4}+$$

$$\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_2^2\xi_1^2}{4\,\hbar}+\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_3\xi_1^2}{2\,\mathcal{A}_2^2\mathcal{A}_3\mathcal{A}_4}+\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_2\eta_3\xi_1^2}{2\,\hbar\,\mathcal{A}_2}+$$

$$\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_3^2\xi_1^2}{4\,\hbar\,\mathcal{A}_2^2}+\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_4\xi_1^2}{2\,\mathcal{A}_2^2\mathcal{A}_3^2\mathcal{A}_4}+\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_2\eta_4\xi_1^2}{2\,\hbar\,\mathcal{A}_2\mathcal{A}_3}+$$

$$\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_3\eta_4\xi_1^2}{2\,\hbar\,\mathcal{A}_2^2\mathcal{A}_3}+\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_4^2\xi_1^2}{4\,\hbar\,\mathcal{A}_2^2\mathcal{A}_3^2}+2\,T\,a_1\eta_3\xi_2+\frac{\gamma\hbar\,x_1y_1\eta_3\xi_2}{\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3\mathcal{A}_4}+$$

$$\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_3^2\xi_2}{2\,\mathcal{A}_1\mathcal{A}_2}+\frac{2\,T\,a_1\eta_4\xi_2}{\mathcal{A}_3}+\frac{\gamma\hbar\,x_1y_1\eta_4\xi_2}{\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3^2\mathcal{A}_4}+\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_3\eta_4\xi_2}{\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3}+\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_4^2\xi_2}{2\,\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3^2}+$$

$$\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_3\xi_1\xi_2}{\mathcal{A}_2\mathcal{A}_3\mathcal{A}_4}+\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_3^2\xi_1\xi_2}{2\,\hbar\,\mathcal{A}_2}+\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_4\xi_1\xi_2}{\mathcal{A}_2\mathcal{A}_3^2\mathcal{A}_4}+$$

$$\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_3\eta_4\xi_1\xi_2}{\hbar\,\mathcal{A}_2\mathcal{A}_3}+\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_4^2\xi_1\xi_2}{2\,\hbar\,\mathcal{A}_2\mathcal{A}_3^2}+\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_3\xi_2^2}{2\,\mathcal{A}_3\mathcal{A}_4}+$$

$$\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_3^2\xi_2^2}{4\,\hbar}+\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_4\xi_2^2}{2\,\mathcal{A}_3^2\mathcal{A}_4}+\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_3\eta_4\xi_2^2}{2\,\hbar\,\mathcal{A}_3}+$$

$$\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_4^2\xi_2^2}{4\,\hbar\,\mathcal{A}_3^2}+2\,T\,a_1\eta_4\xi_3+\frac{\gamma\hbar\,x_1y_1\eta_4\xi_3}{\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3\mathcal{A}_4}+\frac{(\gamma-3\,T\,\gamma)\,y_1\eta_4^2\xi_3}{2\,\mathcal{A}_1\mathcal{A}_2\mathcal{A}_3}+$$

$$\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_4\xi_1\xi_3}{\mathcal{A}_2\mathcal{A}_3\mathcal{A}_4}+\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_4^2\xi_1\xi_3}{2\,\hbar\,\mathcal{A}_2\mathcal{A}_3}+\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_4\xi_2\xi_3}{\mathcal{A}_3\mathcal{A}_4}+$$

$$\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_4^2\xi_2\xi_3}{2\,\hbar\,\mathcal{A}_3}+\frac{(\gamma-3\,T\,\gamma)\,x_1\eta_4\xi_3^2}{2\,\mathcal{A}_4}+\frac{(\gamma-4\,T\,\gamma+3\,T^2\,\gamma)\,\eta_4^2\xi_3^2}{4\,\hbar}\Bigg)\epsilon+O[\epsilon]^2\Big]$$

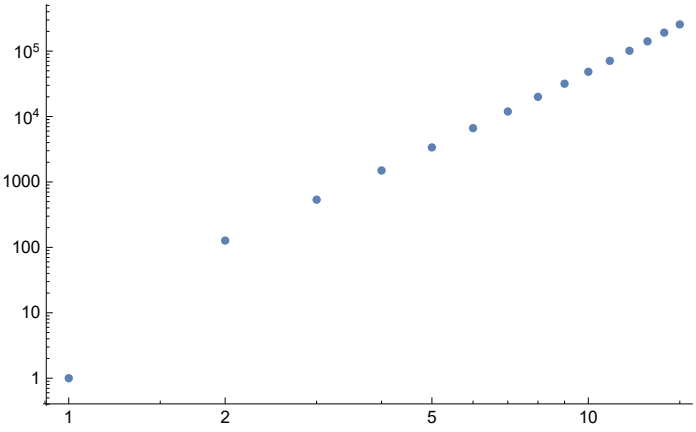
```
In[•]:= Table[LeafCount /@ List @@ km[n], {n, 15}] // MatrixForm
```

Out[•]//MatrixForm=

13	15	1
25	54	127
37	123	536
49	227	1497
61	371	3374
73	560	6649
85	799	11 937
97	1093	20 001
109	1447	31 767
121	1866	48 339
133	2355	71 014
145	2919	101 297
157	3563	140 916
169	4292	191 837
181	5111	256 279

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

Out[•]=




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

```
Out[•]= {6.98868, 5.72007, 5.27393, 5.04763, 4.91261, 4.82417,
 4.76259, 4.71785, 4.6843, 4.65852, 4.63833, 4.62228, 4.60937, 4.59889}
```

In[•]:=
```
PrintProfile[]
```

Out[•]=
```
ProfileRoot is root. Profiled time: 77.327
  (   14)   0.421/ 76.577 above B
  (    1)      0/  0.750 above Boot
Together: called 29310 times, time in 29.074/31.131
  ( 29310)  29.074/ 31.131 under CCF
  ( 29310)   1.995/  2.057 above Exp
CCF: called 29310 times, time in 18.949/50.08
  ( 29290)  18.902/ 50.018 under CF
  (   20)   0.047/  0.062 under Exp
  ( 29310)  29.074/ 31.131 above Together
CF: called 1120 times, time in 13.953/63.971
  (   28)   0.031/  0.220 under EEQ
  (  120)   5.767/ 26.064 under LZip2
  (  972)   8.155/ 37.687 under QZip2
  ( 29290)  18.902/ 50.018 above CCF
LZip2: called 30 times, time in 9.465/37.281
  (   30)   9.465/ 37.281 under B
  (   28)   0.030/  0.250 above EEQ
  (  120)   5.767/ 26.064 above CF
  (   30)   0.374/  1.502 above Zip
Exp: called 29310 times, time in 1.995/2.057
  ( 29310)   1.995/  2.057 under Together
  (   20)   0.047/  0.062 above CCF
Zip: called 235 times, time in 1.951/5.404
  (   30)   0.374/  1.502 under LZip2
  (   30)   0.484/  1.267 under QZip2
  (  175)   1.093/  2.635 under Zip
  (  235)   0.818/  0.818 above Collect
  (  175)   1.093/  2.635 above Zip
Collect: called 235 times, time in 0.818/0.818
  (  235)   0.818/  0.818 under Zip
QZip2: called 30 times, time in 0.624/39.578
  (   30)   0.624/ 39.578 under B
  (  972)   8.155/ 37.687 above CF
  (   30)   0.484/  1.267 above Zip
B: called 30 times, time in 0.437/77.296
  (   16)   0.016/  0.719 under Boot
  (   14)   0.421/ 76.577 under ProfileRoot
  (   30)   9.465/ 37.281 above LZip2
  (   30)   0.624/ 39.578 above QZip2
Boot: called 16 times, time in 0.031/2.173
  (   15)   0.031/  1.423 under Boot
  (    1)      0/  0.750 under ProfileRoot
  (   16)   0.016/  0.719 above B
  (   15)   0.031/  1.423 above Boot
EEQ: called 28 times, time in 0.03/0.25
  (   28)   0.030/  0.250 under LZip2
  (   28)   0.031/  0.220 above CF
```