Pensieve header: Analysis of k=2 invariants in QU.

In[•]:=
```
SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\SL2Portfolio"];
<< KnotTheory`
<< "SL2PortfolioProgram.m"
```

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

In[•]:=
```
OverbayP2Data = Get["C:\\drorbn\\AcademicPensieve\\People\\Overbay\\OverbayP2Data.m"];
```

In[•]:=
```
$p = 5; $k = 2; $U = QU;
```

In[•]:=
```
SCΘ[p_] := Collect[ CΘ@@𝒪CU[{y, a, x}, p] /. {CU → Times, γ | ħ → 1}, ϵ, Simplify];
SQΘ[p_] := Collect[ QΘ@@𝒪QU[{y, a, x}, p] /. {QU → Times, γ | ħ → 1}, ϵ, Simplify];
```

In[•]:=
```
𝔼[L_, Q_, P_]$k_ := 𝔼[L, Q, Series[Normal@P, {ϵ, 0, $k}]];
𝔼d_→r_[L_, Q_, P_]$k_ := 𝔼d→r@@𝔼[L, Q, P]$k;
𝔼3@𝔼[ω_, L_, Q_, Ps_] := CF /@ 𝔼[L, ω^-1 Q, ω^-1 (ω^-4 ϵ)^(-1+Range@Length@Ps .Ps)]$k;
𝔼4@𝔼[L_, Q_, P_] := Module[
   {ω = Normal[P]^-1 /. ϵ → 0, Ps = CoefficientList[P, ϵ]},
   CF /@ 𝔼[ω, L, ω Q, ω^(-3+4 Range@Length@Ps Ps)]];
𝔼3@𝔼sp___[as___] := 𝔼3@𝔼[as] /. 𝔼 → 𝔼sp;
𝔼4@𝔼sp___[as___] := 𝔼4@𝔼[as] /. 𝔼 → 𝔼sp;
```

In[•]:=
```
P[Knot[n_, k_]] := P[Knot[n, k]] = Module[{fname},
    fname = "../SL2Invariant/k=2/Data/" <> ToString[n] <> "_" <> ToString[k] <> ".m";
    Collect[𝔼3[Get[fname]⟦2, 2⟧]⟦3⟧ // Normal, ϵ, Simplify]
   ];
QP[K_Knot] := QP[K] = CF@P[K];
```

In[•]:=
```
H[p_] := If[TrueQ@Simplify[p == (p /. T → 1/T)],
   σ@@CoefficientList[Expand@Together[p] /. T^n_ /; n < 0 :↦ 0, T], p];
```

```
In[•]:= MatrixForm[AllKnots[{3, 7}] /. K_Knot :> {K,
          ω = Factor[(QP@K /. ϵ → 0)^-1]; H@ω,
          qp = Collect[QP@K /. {y → 0}, {ϵ, a}, Factor];
          CoefficientRules[Together[-1 + ω qp /. {ϵ → ω^2 ϵ, a → a / ω}], {ϵ, a}] /. {({1, 0} → p_) :>
              ({1, 0} → T p / (T - 1))} /. ({k_, d_} → p_) :> ({k, d} → H@Factor[p]),
          P1 = Factor@Expand@Together[(* T/(T-1)^2 *) ω^3 Coefficient[qp /. a → -1/2, ϵ]]; H@P1,
          OP2 = K /. OverbayP2Data /. T → T^(1/2); H@OP2}]
```

Out[•]//MatrixForm=

Knot[3, 1]	σ[-1, 1]	
Knot[4, 1]	σ[3, -1]	
Knot[5, 1]	σ[1, -1, 1]	{{2, 2} -
Knot[5, 2]	σ[-3, 2]	
Knot[6, 1]	σ[5, -2]	
Knot[6, 2]	σ[-3, 3, -1]	{{2, 2} → σ[-156, 96, -6, -
Knot[6, 3]	σ[5, -3, 1]	{{2, 2}
Knot[7, 1]	σ[-1, 1, -1, 1]	{{2, 2} → σ[-168, 102, -50, 12, 12, -22, 18], {2, 1} → 2 (18-44 T+63 T
Knot[7, 2]	σ[-5, 3]	
Knot[7, 3]	σ[3, -3, 2]	{{2, 2} → σ[-300, 174, -30, -36, 32], {
Knot[7, 4]	σ[-7, 4]	
Knot[7, 5]	σ[5, -4, 2]	{{2, 2} → σ[-384, 248, -48, -48, 32], {2,
Knot[7, 6]	σ[-7, 5, -1]	{{2, 2} → σ[-348, 200, -6, -30, 8], {
Knot[7, 7]	σ[9, -5, 1]	{{2, 2} → σ[-348, 220, -22, -30, 8], {2