Pensieve header: HOMFLYPT studies following arXiv://1707.07733.

```
<< KnotTheory`
```

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Loading KnotTheory` version of September 6, 2014, 13:37:37.2841.
Read more at http://katlas.org/wiki/KnotTheory.
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```
? HOMFLYPT
```

HOMFLYPT[K][a, z] computes the HOMFLY–PT (Hoste, Ocneanu, Millett, Freyd, Lickorish, Yetter, Przytycki and Traczyk) polynomial of a knot/link K, in the variables a and z.

```
H[K_] := HOMFLYPT[K][a, z]; H /@ AllKnots[7]
```

KnotTheory: Loading precomputed data in PD4Knots`.

KnotTheory: The HOMFLYPT program was written by Scott Morrison.

$$\left\{4 a^6 - 3 a^8 + 10 a^6 z^2 - 4 a^8 z^2 + 6 a^6 z^4 - a^8 z^4 + a^6 z^6,\right.$$
$$a^2 + a^6 - a^8 + a^2 z^2 + a^4 z^2 + a^6 z^2, -\frac{2}{a^8} + \frac{2}{a^6} + \frac{1}{a^4} - \frac{z^2}{a^8} + \frac{3 z^2}{a^6} + \frac{3 z^2}{a^4} + \frac{z^4}{a^6} + \frac{z^4}{a^4},$$
$$-\frac{1}{a^8} + \frac{2}{a^4} + \frac{z^2}{a^6} + \frac{2 z^2}{a^4} + \frac{z^2}{a^2}, 2 a^4 - a^8 + 3 a^4 z^2 + 2 a^6 z^2 - a^8 z^2 + a^4 z^4 + a^6 z^4,$$
$$\left.1 - a^2 + 2 a^4 - a^6 + z^2 - 2 a^2 z^2 + 2 a^4 z^2 - a^2 z^4, 2 + \frac{1}{a^4} - \frac{2}{a^2} + 2 z^2 - \frac{2 z^2}{a^2} - a^2 z^2 + z^4\right\}$$

```
Factor /@ H /@ AllKnots[7] /. z → 0
```

$$\left\{-a^6 \left(-4 + 3 a^2\right), -a^2 \left(-1 - a^4 + a^6\right), \frac{-2 + 2 a^2 + a^4}{a^8},\right.$$
$$\left.\frac{-1 + 2 a^4}{a^8}, -a^4 \left(-2 + a^4\right), 1 - a^2 + 2 a^4 - a^6, -\frac{-1 + 2 a^2 - 2 a^4}{a^4}\right\}$$

```
n = 12;
Ks = AllKnots[n];
M = Table[
    D[
      Coefficient[HOMFLYPT[K][a, z], z, 0],
      {a, j}
     ] /. a → 1,


    {j, 0, 2 n}, {K, Ks}];
MatrixRank[M]
```

```
13
```

```
n = 11;
Ks = AllKnots[{0, n}];
Hs = Table[
   Coefficient[HOMFLYPT[K][a, z], z, 0],
   {K, Ks}];
{Length[Ks], Length[Union[Hs]]}
```

```
{802, 304}
```