

Pensieve header: January 13: Computing the Jones polynomial, cleaner procedure.

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Knot = Xm[1, 12, 2, 13] Xm[7, 2, 8, 3] Xm[3, 8, 4, 9] Xm[11, 4, 12, 5]
      Xp[13, 7, 14, 6] Xp[9, 15, 10, 14] Xp[15, 11, 16, 10] Xp[5, 1, 6, 16]
Xm[1, 12, 2, 13] Xm[3, 8, 4, 9] Xm[7, 2, 8, 3] Xm[11, 4, 12, 5]
Xp[5, 1, 6, 16] Xp[9, 15, 10, 14] Xp[13, 7, 14, 6] Xp[15, 11, 16, 10]

SetAttributes[P, Orderless];
Jones[Knot_] := Module[{t1, t2},
  t1 = Expand[Knot /. {
    Xp[i_, j_, k_, l_] := q * P[i, j] P[k, l] - q^2 * P[i, l] P[j, k],
    Xm[i_, j_, k_, l_] := -q^-2 * P[i, j] P[k, l] + q^-1 * P[i, l] P[j, k]
  }];
  t2 = t1 //. P[a_, b_] P[b_, c_] := P[a, c];
  Simplify[t2 /. {P[i_, i_] := (q+1/q), P[i_, j_]^2 := (q+1/q)}]
]

Jones[Knot]

$$\frac{1}{q^9} - \frac{2}{q^7} + \frac{2}{q^5} - \frac{1}{q^3} + \frac{1}{q} + q - q^3 + 2q^5 - 2q^7 + q^9$$


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