```
In[•]:=
    rule1 = {X[a_, b_, c_, d_] :> A del[a d] del[b c] +
                    B del[a b] del[c d]};
    rule2 = {del[a_ b_] del[b_ c_] :> del[a c]};
    rule3 = {(del[_])^2 :> dd, del[_^2] :> dd};
    RawBracket[t_] := Simplify[(t /. rule1 // Expand) //. rule2 /. rule3]
    rule4 = {B :> 1 / A, dd :> -A^2 - 1 / A^2};
    B[t_] := Simplify[RawBracket[t] / dd /. rule4]
```

```
In[•]:=
    Trefoil = X[e, b, d, a] X[a, d, f, c] X[b, e, c, f];
    RawBracket[Trefoil]
    B[Trefoil]
```

$$Out[•]= \text{dd} \left(3 A^2 B + A^3 \text{dd} + 3 A B^2 \text{dd} + B^3 \text{dd}^2 \right)$$

$$Out[•]= - \frac{-1 + A^4 + A^{12}}{A^7}$$

```
In[•]:=  VTrefoil = X[b, d, c, a] X[a, c, b, d];
    B[VTrefoil]
```

$$Out[•]= 1 - \frac{1}{A^4} + A^2$$

```
In[•]:=
    Collapse = X[k, g, l, f] X[e, k, f, j] X[i, e, j, d]
      X[a, g, p, h] X[h, p, i, o] X[b, l, a, m] X[m, c, n, b] X[c, o, d, n]
    RawBracket[Collapse]
    B[Collapse]
```

$$Out[•]= X[a, g, p, h] X[b, l, a, m] X[c, o, d, n] X[e, k, f, j]$$
$$X[h, p, i, o] X[i, e, j, d] X[k, g, l, f] X[m, c, n, b]$$

$$Out[•]= \text{dd} \left(8 A B^7 \text{dd} + B^8 \text{dd}^2 + A^8 \text{dd}^4 + 2 A^7 B \text{dd}^3 \left(3 + \text{dd}^2\right) + 4 A^2 B^6 \left(3 + 4 \text{dd}^2\right) + 4 A^3 B^5 \text{dd} \left(9 + 5 \text{dd}^2\right) + \right.$$
$$\left. A^6 B^2 \text{dd}^2 \left(15 + 12 \text{dd}^2 + \text{dd}^4\right) + 2 A^5 B^3 \text{dd} \left(9 + 16 \text{dd}^2 + 3 \text{dd}^4\right) + A^4 B^4 \left(9 + 46 \text{dd}^2 + 15 \text{dd}^4\right) \right)$$

$$Out[•]= \frac{1}{A^{12}} + \frac{1}{A^4} - A^8$$