

We now consider the simplified model of minial-system-extend10.

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[> with(LinearAlgebra) :
[> interface(rtablesize = 80) :
```

We consider the following biochemical reaction network

```
K + OR <-> K_OR -> K + ORp
K + OT <-> K_OT -> K + OTp
ORp -> OR
OTp -> OT
OR <-> OT
ORp <-> OTp
K_OR <-> K_OT
```

The species for this reaction networks are

{OR (1), ORp (2), OT (3), OTp (4), K (5), K_OR (6), K_OT (7)}

There are total 14 reactions and 7 species.

Using the same method, we construct the mass-action ODE system by defining the stoichiometric matrix A , and the vector of rates k_{rs} .

$$\frac{dx}{dt} = A \cdot k_{rs}$$

The steady states is given by $A \cdot k_{rs} = 0$. Now we construct the stoichiometric matrix:

```
[> A := Matrix(14, 7) :
[> A[1, 1] := -1 : A[1, 5] := -1 : A[1, 6] := 1 : A[2] := -A[1] :
[> A[3, 2] := 1 : A[3, 5] := 1 : A[3, 6] := -1 :
[> A[4, 3] := -1 : A[4, 5] := -1 : A[4, 7] := 1 : A[5] := -A[4] :
[> A[6, 4] := 1 : A[6, 5] := 1 : A[6, 7] := -1 :
[> A[7, 2] := -1 : A[7, 1] := 1 : A[8, 4] := -1 : A[8, 3] := 1 :
[> A[9, 1] := -1 : A[9, 3] := 1 : A[10] := -A[9] :
[> A[11, 2] := -1 : A[11, 4] := 1 : A[12] := -A[11] :
[> A[13, 6] := -1 : A[13, 7] := 1 : A[14] := -A[13] :
[> A := Transpose(A)
```

$$A := \begin{bmatrix} -1 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & -1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 0 & -1 & 1 & 0 & 0 & 1 & 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & -1 & 0 & 0 & 1 & -1 & 0 & 0 \\ -1 & 1 & 1 & -1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & -1 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 1 \\ 0 & 0 & 0 & 1 & -1 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 \end{bmatrix} \quad (1)$$

> $ks := \text{Vector}([k_1 \cdot x_1 \cdot x_5, k_2 \cdot x_6, k_3 \cdot x_6, k_4 \cdot x_3 \cdot x_5, k_5 \cdot x_7, k_6 \cdot x_7, k_7 \cdot x_2, k_8 \cdot x_4, k_9 \cdot x_1, k_{10} \cdot x_3, k_{11} \cdot x_2, k_{12} \cdot x_4, k_{13} \cdot x_6, k_{14} \cdot x_7])$

$$ks := \begin{bmatrix} k_1 x_1 x_5 \\ k_2 x_6 \\ k_3 x_6 \\ k_4 x_3 x_5 \\ k_5 x_7 \\ k_6 x_7 \\ k_7 x_2 \\ k_8 x_4 \\ k_9 x_1 \\ k_{10} x_3 \\ k_{11} x_2 \\ k_{12} x_4 \\ k_{13} x_6 \\ k_{14} x_7 \end{bmatrix} \quad (2)$$

>

> $ssEqs := A.ks$

(3)

$$ssEqs := \begin{bmatrix} -k_1 x_1 x_5 + k_2 x_6 + k_7 x_2 - k_9 x_1 + k_{10} x_3 \\ k_3 x_6 - k_7 x_2 - k_{11} x_2 + k_{12} x_4 \\ -k_4 x_3 x_5 + k_5 x_7 + k_8 x_4 + k_9 x_1 - k_{10} x_3 \\ k_6 x_7 - k_8 x_4 + k_{11} x_2 - k_{12} x_4 \\ -k_1 x_1 x_5 - k_4 x_3 x_5 + k_2 x_6 + k_3 x_6 + k_5 x_7 + k_6 x_7 \\ k_1 x_1 x_5 - k_2 x_6 - k_3 x_6 - k_{13} x_6 + k_{14} x_7 \\ k_4 x_3 x_5 - k_5 x_7 - k_6 x_7 + k_{13} x_6 - k_{14} x_7 \end{bmatrix} \quad (3)$$

$$\begin{aligned} & \text{# conservation laws:} \\ & F := \text{ReducedRowEchelonForm}(\text{Transpose}(\text{Matrix}([\text{op}(\text{NullSpace}(\text{Transpose}(A)))]))) \\ & F := \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 \end{bmatrix} \end{aligned} \quad (4)$$

The conservation laws are:

$$x_1 + x_2 + x_3 + x_4 + x_6 + x_7 - T_1, x_5 + x_6 + x_7 - T_2$$

$$\begin{aligned} & \text{subsEqs} := [ssEqs[2], ssEqs[3], ssEqs[1], ssEqs[6], ssEqs[7], x_1 + x_2 + x_3 + x_4 + x_6 + x_7 \\ & \quad - T_1, x_5 + x_6 + x_7 - T_2] \\ & \text{subsEqs} := [k_3 x_6 - k_7 x_2 - k_{11} x_2 + k_{12} x_4, -k_4 x_3 x_5 + k_5 x_7 + k_8 x_4 + k_9 x_1 - k_{10} x_3, \\ & \quad -k_1 x_1 x_5 + k_2 x_6 + k_7 x_2 - k_9 x_1 + k_{10} x_3, k_1 x_1 x_5 - k_2 x_6 - k_3 x_6 - k_{13} x_6 + k_{14} x_7, \\ & \quad k_4 x_3 x_5 - k_5 x_7 - k_6 x_7 + k_{13} x_6 - k_{14} x_7, x_1 + x_2 + x_3 + x_4 + x_6 + x_7 - T_1, x_5 + x_6 + x_7 \\ & \quad - T_2] \end{aligned} \quad (5)$$

$$\begin{aligned} & \text{# now compute the Jacobian of the subsEqs:} \\ & J := \text{VectorCalculus}[\text{Jacobian}](\text{subsEqs}, [\text{seq}(x_i, i = 1..7)]) \end{aligned}$$

(6)

$$J := \begin{bmatrix} 0 & -k_7 - k_{11} & 0 & k_{12} & 0 & k_3 & 0 \\ k_9 & 0 & -k_4 x_5 - k_{10} & k_8 & -k_4 x_3 & 0 & k_5 \\ -k_1 x_5 - k_9 & k_7 & k_{10} & 0 & -k_1 x_1 & k_2 & 0 \\ k_1 x_5 & 0 & 0 & 0 & k_1 x_1 & -k_2 - k_3 - k_{13} & k_{14} \\ 0 & 0 & k_4 x_5 & 0 & k_4 x_3 & k_{13} & -k_5 - k_6 - k_{14} \\ 1 & 1 & 1 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 \end{bmatrix} \quad (6)$$

> Determinant(J) :

> detJ := collect(%, {seq(x_i, i = 1..7)}, 'distributed')

$$\begin{aligned} \det J := & (k_1 k_3 k_4 k_8 k_9 - k_1 k_3 k_4 k_8 k_{11} + k_1 k_3 k_4 k_9 k_{11} + k_1 k_3 k_4 k_9 k_{12} - k_1 k_4 k_6 k_7 k_9 \\ & - k_1 k_4 k_6 k_7 k_{12} - k_1 k_4 k_6 k_9 k_{11} - k_1 k_4 k_6 k_9 k_{12} - k_1 k_4 k_7 k_8 k_{13} - k_1 k_4 k_7 k_8 k_{14} \\ & - k_1 k_4 k_7 k_{12} k_{13} - k_1 k_4 k_7 k_{12} k_{14} - k_1 k_4 k_8 k_{11} k_{13} - k_1 k_4 k_8 k_{11} k_{14}) x_1 x_5 + (\\ & - k_1 k_3 k_4 k_8 k_{10} - k_1 k_3 k_4 k_8 k_{11} - k_1 k_3 k_4 k_{10} k_{11} - k_1 k_3 k_4 k_{10} k_{12} + k_1 k_4 k_6 k_7 k_{10} \\ & - k_1 k_4 k_6 k_7 k_{12} + k_1 k_4 k_6 k_{10} k_{11} + k_1 k_4 k_6 k_{10} k_{12} - k_1 k_4 k_7 k_8 k_{13} - k_1 k_4 k_7 k_8 k_{14} \\ & - k_1 k_4 k_7 k_{12} k_{13} - k_1 k_4 k_7 k_{12} k_{14} - k_1 k_4 k_8 k_{11} k_{13} - k_1 k_4 k_8 k_{11} k_{14}) x_3 x_5 + (\\ & - k_1 k_3 k_4 k_6 k_{11} - k_1 k_3 k_4 k_6 k_{12} - k_1 k_3 k_4 k_8 k_{11} - k_1 k_3 k_4 k_8 k_{14} - k_1 k_3 k_4 k_{11} k_{14} \\ & - k_1 k_3 k_4 k_{12} k_{14} - k_1 k_4 k_6 k_7 k_{12} - k_1 k_4 k_6 k_7 k_{13} - k_1 k_4 k_6 k_{11} k_{13} - k_1 k_4 k_6 k_{12} k_{13} \\ & - k_1 k_4 k_7 k_8 k_{13} - k_1 k_4 k_7 k_8 k_{14} - k_1 k_4 k_7 k_{12} k_{13} - k_1 k_4 k_7 k_{12} k_{14} - k_1 k_4 k_8 k_{11} k_{13} \\ & - k_1 k_4 k_8 k_{11} k_{14}) x_5^2 + (-k_1 k_3 k_5 k_8 k_{10} - k_1 k_3 k_5 k_8 k_{11} - k_1 k_3 k_5 k_{10} k_{11} \\ & - k_1 k_3 k_5 k_{10} k_{12} - k_1 k_3 k_6 k_8 k_{10} - k_1 k_3 k_6 k_8 k_{11} - k_1 k_3 k_6 k_{10} k_{11} - k_1 k_3 k_6 k_{10} k_{12} \\ & - k_1 k_3 k_8 k_{10} k_{14} - k_1 k_3 k_8 k_{11} k_{14} - k_1 k_3 k_{10} k_{11} k_{14} - k_1 k_3 k_{10} k_{12} k_{14} - k_1 k_5 k_7 k_8 k_{10} \\ & - k_1 k_5 k_7 k_8 k_{13} - k_1 k_5 k_7 k_{10} k_{12} - k_1 k_5 k_7 k_{12} k_{13} - k_1 k_5 k_8 k_{10} k_{11} - k_1 k_5 k_8 k_{11} k_{13} \\ & - k_1 k_6 k_7 k_8 k_{10} - k_1 k_6 k_7 k_8 k_{13} - k_1 k_6 k_7 k_{10} k_{12} - k_1 k_6 k_7 k_{10} k_{13} - k_1 k_6 k_8 k_{10} k_{11} \\ & - k_1 k_6 k_8 k_{11} k_{13} - k_1 k_6 k_{10} k_{11} k_{13} - k_1 k_6 k_{10} k_{12} k_{13} - k_1 k_7 k_8 k_{10} k_{13} \\ & - k_1 k_7 k_8 k_{10} k_{14} - k_1 k_7 k_{10} k_{12} k_{13} - k_1 k_7 k_{10} k_{12} k_{14} - k_1 k_8 k_{10} k_{11} k_{13} \\ & - k_1 k_8 k_{10} k_{11} k_{14} - k_2 k_4 k_6 k_7 k_9 - k_2 k_4 k_6 k_7 k_{12} - k_2 k_4 k_6 k_9 k_{11} - k_2 k_4 k_6 k_9 k_{12} \\ & - k_2 k_4 k_7 k_8 k_9 - k_2 k_4 k_7 k_8 k_{14} - k_2 k_4 k_7 k_9 k_{12} - k_2 k_4 k_7 k_{12} k_{14} - k_2 k_4 k_8 k_9 k_{11} \\ & - k_2 k_4 k_8 k_{11} k_{14} - k_3 k_4 k_6 k_7 k_9 - k_3 k_4 k_6 k_7 k_{12} - k_3 k_4 k_6 k_9 k_{11} - k_3 k_4 k_6 k_9 k_{12} \\ & - k_3 k_4 k_7 k_8 k_9 - k_3 k_4 k_7 k_8 k_{14} - k_3 k_4 k_7 k_9 k_{12} - k_3 k_4 k_7 k_{12} k_{14} - k_3 k_4 k_8 k_9 k_{11} \\ & - k_3 k_4 k_8 k_9 k_{14} - k_3 k_4 k_9 k_{11} k_{14} - k_3 k_4 k_9 k_{12} k_{14} - k_4 k_6 k_7 k_9 k_{13} - k_4 k_6 k_7 k_{12} k_{13} \\ & - k_4 k_6 k_9 k_{11} k_{13} - k_4 k_6 k_9 k_{12} k_{13} - k_4 k_7 k_8 k_9 k_{13} - k_4 k_7 k_8 k_9 k_{14} - k_4 k_7 k_9 k_{12} k_{13} \end{aligned} \quad (7)$$

$$\begin{aligned}
& -k_4 k_7 k_9 k_{12} k_{14} - k_4 k_8 k_9 k_{11} k_{13} - k_4 k_8 k_9 k_{11} k_{14}) x_5 + (-k_1 k_5 k_7 k_8 k_9 \\
& -k_1 k_5 k_7 k_8 k_{10} - k_1 k_5 k_7 k_9 k_{12} - k_1 k_5 k_7 k_{10} k_{12} - k_1 k_5 k_8 k_9 k_{11} - k_1 k_5 k_8 k_{10} k_{11} \\
& -k_1 k_6 k_7 k_8 k_9 - k_1 k_6 k_7 k_8 k_{10} - k_1 k_6 k_7 k_9 k_{12} - k_1 k_6 k_7 k_{10} k_{12} - k_1 k_6 k_8 k_9 k_{11} \\
& -k_1 k_6 k_8 k_{10} k_{11} - k_1 k_7 k_8 k_9 k_{13} - k_1 k_7 k_8 k_9 k_{14} - k_1 k_7 k_8 k_{10} k_{13} - k_1 k_7 k_8 k_{10} k_{14} \\
& -k_1 k_7 k_9 k_{12} k_{13} - k_1 k_7 k_9 k_{12} k_{14} - k_1 k_7 k_{10} k_{12} k_{13} - k_1 k_7 k_{10} k_{12} k_{14} \\
& -k_1 k_8 k_9 k_{11} k_{13} - k_1 k_8 k_9 k_{11} k_{14} - k_1 k_8 k_{10} k_{11} k_{13} - k_1 k_8 k_{10} k_{11} k_{14}) x_1 + (\\
& -k_2 k_4 k_7 k_8 k_9 - k_2 k_4 k_7 k_8 k_{10} - k_2 k_4 k_7 k_9 k_{12} - k_2 k_4 k_7 k_{10} k_{12} - k_2 k_4 k_8 k_9 k_{11} \\
& -k_2 k_4 k_8 k_{10} k_{11} - k_3 k_4 k_7 k_8 k_9 - k_3 k_4 k_7 k_8 k_{10} - k_3 k_4 k_7 k_9 k_{12} - k_3 k_4 k_7 k_{10} k_{12} \\
& -k_3 k_4 k_8 k_9 k_{11} - k_3 k_4 k_8 k_{10} k_{11} - k_4 k_7 k_8 k_9 k_{13} - k_4 k_7 k_8 k_9 k_{14} - k_4 k_7 k_8 k_{10} k_{13} \\
& -k_4 k_7 k_8 k_{10} k_{14} - k_4 k_7 k_9 k_{12} k_{13} - k_4 k_7 k_9 k_{12} k_{14} - k_4 k_7 k_{10} k_{12} k_{13} \\
& -k_4 k_7 k_{10} k_{12} k_{14} - k_4 k_8 k_9 k_{11} k_{13} - k_4 k_8 k_9 k_{11} k_{14} - k_4 k_8 k_{10} k_{11} k_{13} \\
& -k_4 k_8 k_{10} k_{11} k_{14}) x_3 - k_3 k_6 k_8 k_{10} k_{11} - k_3 k_7 k_8 k_9 k_{14} - k_3 k_7 k_8 k_{10} k_{14} \\
& -k_3 k_8 k_9 k_{11} k_{14} - k_3 k_8 k_{10} k_{11} k_{14} - k_5 k_7 k_8 k_9 k_{13} - k_5 k_7 k_8 k_{10} k_{13} - k_5 k_8 k_9 k_{11} k_{13} \\
& -k_5 k_8 k_{10} k_{11} k_{13} - k_6 k_7 k_8 k_9 k_{13} - k_6 k_7 k_8 k_{10} k_{13} - k_6 k_8 k_9 k_{11} k_{13} - k_6 k_8 k_{10} k_{11} k_{13} \\
& -k_2 k_5 k_7 k_9 k_{12} - k_2 k_5 k_7 k_{10} k_{12} - k_2 k_6 k_7 k_9 k_{12} - k_2 k_6 k_7 k_{10} k_{12} - k_2 k_7 k_9 k_{12} k_{14} \\
& -k_2 k_7 k_{10} k_{12} k_{14} - k_3 k_5 k_7 k_9 k_{12} - k_3 k_5 k_7 k_{10} k_{12} - k_3 k_6 k_7 k_9 k_{12} - k_3 k_6 k_7 k_{10} k_{12} \\
& -k_3 k_7 k_9 k_{12} k_{14} - k_3 k_7 k_{10} k_{12} k_{14} - k_5 k_7 k_9 k_{12} k_{13} - k_5 k_7 k_{10} k_{12} k_{13} \\
& -k_6 k_7 k_9 k_{12} k_{13} - k_6 k_7 k_{10} k_{12} k_{13} - k_2 k_5 k_7 k_8 k_9 - k_2 k_5 k_7 k_8 k_{10} - k_2 k_5 k_8 k_9 k_{11} \\
& -k_2 k_5 k_8 k_{10} k_{11} - k_2 k_6 k_7 k_8 k_9 - k_2 k_6 k_7 k_8 k_{10} - k_2 k_6 k_8 k_9 k_{11} - k_2 k_6 k_8 k_{10} k_{11} \\
& -k_2 k_7 k_8 k_9 k_{14} - k_2 k_7 k_8 k_{10} k_{14} - k_2 k_8 k_9 k_{11} k_{14} - k_2 k_8 k_{10} k_{11} k_{14} - k_3 k_5 k_7 k_8 k_9 \\
& -k_3 k_5 k_7 k_8 k_{10} - k_3 k_5 k_8 k_9 k_{11} - k_3 k_5 k_8 k_{10} k_{11} - k_3 k_6 k_7 k_8 k_9 - k_3 k_6 k_7 k_8 k_{10} \\
& -k_3 k_6 k_8 k_9 k_{11}
\end{aligned}$$

>

> # parameterise the steady states as function of x_1 and x_3 ,

using the other five steady state equations : (when x_1 and x_3 are positive, so are the rest)

> solution := solve([subsEqs[1], subsEqs[2], subsEqs[3], subsEqs[4], subsEqs[5]], [x₂, x₃, x₁, x₆, x₇])

$$\text{solution} := \left[\begin{aligned} x_2 = & (x_4 (k_1 k_3 k_4 k_6 k_{12} x_5 + k_1 k_3 k_4 k_8 k_{14} x_5 + k_1 k_3 k_4 k_{12} k_{14} x_5 \\
& + k_1 k_4 k_6 k_{12} k_{13} x_5 + k_1 k_3 k_5 k_8 k_{10} + k_1 k_3 k_5 k_{10} k_{12} + k_1 k_3 k_6 k_8 k_{10} + k_1 k_3 k_6 k_{10} k_{12} \end{aligned} \right. \quad (8)$$

$$\begin{aligned}
& + k_1 k_4 k_6 k_{12} k_{13} x_5 + k_1 k_3 k_5 k_8 k_{10} + k_1 k_3 k_5 k_{10} k_{12} + k_1 k_3 k_6 k_8 k_{10} + k_1 k_3 k_6 k_{10} k_{12}
\end{aligned}$$

$$\begin{aligned}
& + k_1 k_3 k_8 k_{10} k_{14} + k_1 k_3 k_{10} k_{12} k_{14} + k_1 k_6 k_{10} k_{12} k_{13} + k_2 k_4 k_6 k_9 k_{12} + k_3 k_4 k_6 k_9 k_{12} \\
& + k_3 k_4 k_8 k_9 k_{14} + k_3 k_4 k_9 k_{12} k_{14} + k_4 k_6 k_9 k_{12} k_{13} \Big) \Big/ \Big((k_1 k_3 k_4 k_6 k_{11} x_5 \\
& + k_1 k_3 k_4 k_{11} k_{14} x_5 + k_1 k_4 k_6 k_7 k_{13} x_5 + k_1 k_4 k_6 k_{11} k_{13} x_5 + k_1 k_3 k_5 k_{10} k_{11} \\
& + k_1 k_3 k_6 k_{10} k_{11} + k_1 k_3 k_{10} k_{11} k_{14} + k_1 k_6 k_7 k_{10} k_{13} + k_1 k_6 k_{10} k_{11} k_{13} + k_2 k_4 k_6 k_7 k_9 \\
& + k_2 k_4 k_6 k_9 k_{11} + k_3 k_4 k_6 k_7 k_9 + k_3 k_4 k_6 k_9 k_{11} + k_3 k_4 k_9 k_{11} k_{14} + k_4 k_6 k_7 k_9 k_{13} \\
& + k_4 k_6 k_9 k_{11} k_{13} \Big), x_3 = \Big(x_4 \Big((k_1 k_3 k_5 k_8 k_{11} x_5 + k_1 k_3 k_6 k_8 k_{11} x_5 \\
& + k_1 k_3 k_8 k_{11} k_{14} x_5 + k_1 k_5 k_7 k_8 k_{13} x_5 + k_1 k_5 k_7 k_{12} k_{13} x_5 + k_1 k_5 k_8 k_{11} k_{13} x_5 \\
& + k_1 k_6 k_7 k_8 k_{13} x_5 + k_1 k_6 k_8 k_{11} k_{13} x_5 + k_2 k_5 k_7 k_8 k_9 + k_2 k_5 k_7 k_9 k_{12} + k_2 k_5 k_8 k_9 k_{11} \\
& + k_2 k_6 k_7 k_8 k_9 + k_2 k_6 k_7 k_9 k_{12} + k_2 k_6 k_8 k_9 k_{11} + k_2 k_7 k_8 k_9 k_{14} + k_2 k_7 k_9 k_{12} k_{14} \\
& + k_2 k_8 k_9 k_{11} k_{14} + k_3 k_5 k_7 k_8 k_9 + k_3 k_5 k_7 k_9 k_{12} + k_3 k_5 k_8 k_9 k_{11} + k_3 k_6 k_7 k_8 k_9 \\
& + k_3 k_6 k_7 k_9 k_{12} + k_3 k_6 k_8 k_9 k_{11} + k_3 k_7 k_8 k_9 k_{14} + k_3 k_7 k_9 k_{12} k_{14} + k_3 k_8 k_9 k_{11} k_{14} \\
& + k_5 k_7 k_8 k_9 k_{13} + k_5 k_7 k_9 k_{12} k_{13} + k_5 k_8 k_9 k_{11} k_{13} + k_6 k_7 k_8 k_9 k_{13} + k_6 k_7 k_9 k_{12} k_{13} \\
& + k_6 k_8 k_9 k_{11} k_{13} \Big) \Big) \Big/ \Big((k_1 k_3 k_4 k_6 k_{11} x_5 + k_1 k_3 k_4 k_{11} k_{14} x_5 + k_1 k_4 k_6 k_7 k_{13} x_5 \\
& + k_1 k_4 k_6 k_{11} k_{13} x_5 + k_1 k_3 k_5 k_{10} k_{11} + k_1 k_3 k_6 k_{10} k_{11} + k_1 k_3 k_{10} k_{11} k_{14} \\
& + k_1 k_6 k_7 k_{10} k_{13} + k_1 k_6 k_{10} k_{11} k_{13} + k_2 k_4 k_6 k_7 k_9 + k_2 k_4 k_6 k_9 k_{11} + k_3 k_4 k_6 k_7 k_9 \\
& + k_3 k_4 k_6 k_9 k_{11} + k_3 k_4 k_9 k_{11} k_{14} + k_4 k_6 k_7 k_9 k_{13} + k_4 k_6 k_9 k_{11} k_{13} \Big) x_5 \Big), x_1
\end{aligned}$$

$$\begin{aligned}
&= (x_4 (k_2 k_4 k_6 k_7 k_{12} x_5 + k_2 k_4 k_7 k_8 k_{14} x_5 + k_2 k_4 k_7 k_{12} k_{14} x_5 + k_2 k_4 k_8 k_{11} k_{14} x_5 \\
&+ k_3 k_4 k_6 k_7 k_{12} x_5 + k_3 k_4 k_7 k_8 k_{14} x_5 + k_3 k_4 k_7 k_{12} k_{14} x_5 + k_4 k_6 k_7 k_{12} k_{13} x_5 \\
&+ k_2 k_5 k_7 k_8 k_{10} + k_2 k_5 k_7 k_{10} k_{12} + k_2 k_5 k_8 k_{10} k_{11} + k_2 k_6 k_7 k_8 k_{10} + k_2 k_6 k_7 k_{10} k_{12} \\
&+ k_2 k_6 k_8 k_{10} k_{11} + k_2 k_7 k_8 k_{10} k_{14} + k_2 k_7 k_{10} k_{12} k_{14} + k_2 k_8 k_{10} k_{11} k_{14} + k_3 k_5 k_7 k_8 k_{10} \\
&+ k_3 k_5 k_7 k_{10} k_{12} + k_3 k_5 k_8 k_{10} k_{11} + k_3 k_6 k_7 k_8 k_{10} + k_3 k_6 k_7 k_{10} k_{12} + k_3 k_6 k_8 k_{10} k_{11} \\
&+ k_3 k_7 k_8 k_{10} k_{14} + k_3 k_7 k_{10} k_{12} k_{14} + k_3 k_8 k_{10} k_{11} k_{14} + k_5 k_7 k_8 k_{10} k_{13} \\
&+ k_5 k_7 k_{10} k_{12} k_{13} + k_5 k_8 k_{10} k_{11} k_{13} + k_6 k_7 k_8 k_{10} k_{13} + k_6 k_7 k_{10} k_{12} k_{13} \\
&+ k_6 k_8 k_{10} k_{11} k_{13})) / (x_5 (k_1 k_3 k_4 k_6 k_{11} x_5 + k_1 k_3 k_4 k_{11} k_{14} x_5 + k_1 k_4 k_6 k_7 k_{13} x_5 \\
&+ k_1 k_4 k_6 k_{11} k_{13} x_5 + k_1 k_3 k_5 k_{10} k_{11} + k_1 k_3 k_6 k_{10} k_{11} + k_1 k_3 k_{10} k_{11} k_{14} \\
&+ k_1 k_6 k_7 k_{10} k_{13} + k_1 k_6 k_{10} k_{11} k_{13} + k_2 k_4 k_6 k_7 k_9 + k_2 k_4 k_6 k_9 k_{11} + k_3 k_4 k_6 k_7 k_9 \\
&+ k_3 k_4 k_6 k_9 k_{11} + k_3 k_4 k_9 k_{11} k_{14} + k_4 k_6 k_7 k_9 k_{13} + k_4 k_6 k_9 k_{11} k_{13})) , x_6 \\
&= (x_4 (k_1 k_4 k_6 k_7 k_{12} x_5 + k_1 k_4 k_7 k_8 k_{14} x_5 + k_1 k_4 k_7 k_{12} k_{14} x_5 + k_1 k_4 k_8 k_{11} k_{14} x_5 \\
&+ k_1 k_5 k_7 k_8 k_{10} + k_1 k_5 k_7 k_{10} k_{12} + k_1 k_5 k_8 k_{10} k_{11} + k_1 k_6 k_7 k_8 k_{10} + k_1 k_6 k_7 k_{10} k_{12} \\
&+ k_1 k_6 k_8 k_{10} k_{11} + k_1 k_7 k_8 k_{10} k_{14} + k_1 k_7 k_{10} k_{12} k_{14} + k_1 k_8 k_{10} k_{11} k_{14} + k_4 k_7 k_8 k_9 k_{14} \\
&+ k_4 k_7 k_9 k_{12} k_{14} + k_4 k_8 k_9 k_{11} k_{14})) / (k_1 k_3 k_4 k_6 k_{11} x_5 + k_1 k_3 k_4 k_{11} k_{14} x_5 \\
&+ k_1 k_4 k_6 k_7 k_{13} x_5 + k_1 k_4 k_6 k_{11} k_{13} x_5 + k_1 k_3 k_5 k_{10} k_{11} + k_1 k_3 k_6 k_{10} k_{11}
\end{aligned}$$

$$\begin{aligned}
& + k_1 k_3 k_{10} k_{11} k_{14} + k_1 k_6 k_7 k_{10} k_{13} + k_1 k_6 k_{10} k_{11} k_{13} + k_2 k_4 k_6 k_7 k_9 + k_2 k_4 k_6 k_9 k_{11} \\
& + k_3 k_4 k_6 k_7 k_9 + k_3 k_4 k_6 k_9 k_{11} + k_3 k_4 k_9 k_{11} k_{14} + k_4 k_6 k_7 k_9 k_{13} + k_4 k_6 k_9 k_{11} k_{13}), x_7 \\
& = \left((k_1 k_3 k_4 k_8 k_{11} x_5 + k_1 k_4 k_7 k_8 k_{13} x_5 + k_1 k_4 k_7 k_{12} k_{13} x_5 + k_1 k_4 k_8 k_{11} k_{13} x_5 \right. \\
& + k_1 k_7 k_8 k_{10} k_{13} + k_1 k_7 k_{10} k_{12} k_{13} + k_1 k_8 k_{10} k_{11} k_{13} + k_2 k_4 k_7 k_8 k_9 + k_2 k_4 k_7 k_9 k_{12} \\
& + k_2 k_4 k_8 k_9 k_{11} + k_3 k_4 k_7 k_8 k_9 + k_3 k_4 k_7 k_9 k_{12} + k_3 k_4 k_8 k_9 k_{11} + k_4 k_7 k_8 k_9 k_{13} \\
& + k_4 k_7 k_9 k_{12} k_{13} + k_4 k_8 k_9 k_{11} k_{13}) x_4) / (k_1 k_3 k_4 k_6 k_{11} x_5 + k_1 k_3 k_4 k_{11} k_{14} x_5 \\
& + k_1 k_4 k_6 k_7 k_{13} x_5 + k_1 k_4 k_6 k_{11} k_{13} x_5 + k_1 k_3 k_5 k_{10} k_{11} + k_1 k_3 k_6 k_{10} k_{11} \\
& + k_1 k_3 k_{10} k_{11} k_{14} + k_1 k_6 k_7 k_{10} k_{13} + k_1 k_6 k_{10} k_{11} k_{13} + k_2 k_4 k_6 k_7 k_9 + k_2 k_4 k_6 k_9 k_{11} \\
& \left. + k_3 k_4 k_6 k_7 k_9 + k_3 k_4 k_6 k_9 k_{11} + k_3 k_4 k_9 k_{11} k_{14} + k_4 k_6 k_7 k_9 k_{13} + k_4 k_6 k_9 k_{11} k_{13}) \right) \Big]
\end{aligned}$$

> *detSubs* := *subs*(*solution*[1], *detJ*) :

> *polSubs* := *numer*(*detSubs*) :

> *finalPol* := *collect*(*polSubs*, {*x*₄, *x*₅}, 'distributed')

$$\text{finalPol} := \left(-k_1^2 k_3^2 k_4 k_5 k_8^2 k_{10} k_{11} - k_1^2 k_3^2 k_4 k_5 k_8^2 k_{11}^2 - k_1^2 k_3^2 k_4 k_5 k_8 k_{10} k_{11}^2 - k_1^2 \right. \quad (9)$$

$$\begin{aligned}
& k_3^2 k_4 k_5 k_8 k_{10} k_{11} k_{12} - k_1^2 k_3^2 k_4 k_6 k_8^2 k_{10} k_{11} - k_1^2 k_3^2 k_4 k_6 k_8^2 k_{11}^2 - k_1^2 k_3^2 k_4 k_6 k_8 k_{10} k_{11}^2 - \\
& k_1^2 k_3^2 k_4 k_6 k_8 k_{10} k_{11} k_{12} - k_1^2 k_3^2 k_4 k_8^2 k_{10} k_{11} k_{14} - k_1^2 k_3^2 k_4 k_8^2 k_{11}^2 k_{14} - k_1^2 k_3^2 k_4 k_8 k_{10} \\
& k_{11}^2 k_{14} - k_1^2 k_3^2 k_4 k_8 k_{10} k_{11} k_{12} k_{14} + k_1^2 k_3 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} - \\
& k_1^2 k_3 k_4 k_5 k_6 k_7 k_8 k_{11} k_{12} + k_1^2 k_3 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 + k_1^2 k_3 k_4 k_5 k_6 k_8 k_{10} k_{11} k_{12} - \\
& k_1^2 k_3 k_4 k_5 k_7 k_8^2 k_{10} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_7 k_8^2 k_{11} k_{13} - k_1^2 k_3 k_4 k_5 k_7 k_8^2 k_{11} k_{14} - \\
& k_1^2 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_7 k_8 k_{10} k_{12} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_7 k_8 k_{11} k_{12} k_{13} \\
& - k_1^2 k_3 k_4 k_5 k_7 k_8 k_{11} k_{12} k_{14} - k_1^2 k_3 k_4 k_5 k_7 k_{10} k_{11} k_{12} k_{13} - k_1^2 k_3 k_4 k_5 k_7 k_{10} k_{12}^2 k_{13} - \\
& k_1^2 k_3 k_4 k_5 k_8^2 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_8^2 k_{11}^2 k_{13} - k_1^2 k_3 k_4 k_5 k_8^2 k_{11}^2 k_{14} - \\
& k_1^2 k_3 k_4 k_5 k_8 k_{10} k_{11}^2 k_{13} - k_1^2 k_3 k_4 k_5 k_8 k_{10} k_{11} k_{12} k_{13} + k_1^2 k_3 k_4 k_6^2 k_7 k_8 k_{10} k_{11} - \\
& k_1^2 k_3 k_4 k_6^2 k_7 k_8 k_{11} k_{12} + k_1^2 k_3 k_4 k_6^2 k_8 k_{10} k_{11}^2 + k_1^2 k_3 k_4 k_6^2 k_8 k_{10} k_{11} k_{12} - k_1^2 k_3 k_4 k_6 k_7 \\
& k_8 k_{10} k_{13} - 2 k_1^2 k_3 k_4 k_6 k_7 k_8^2 k_{11} k_{13} - k_1^2 k_3 k_4 k_6 k_7 k_8^2 k_{11} k_{14} - \\
& k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{13} + k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{14} - k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{12} k_{13} - \\
& k_1^2 k_3 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13} - 2 k_1^2 k_3 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{14} - k_1^2 k_3 k_4 k_6 k_8^2 k_{10} k_{11} k_{13} - 2 \\
& k_1^2 k_3 k_4 k_6 k_8^2 k_{11}^2 k_{13} - k_1^2 k_3 k_4 k_6 k_8^2 k_{11}^2 k_{14} - k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11}^2 k_{13} + k_1^2 k_3 k_4 k_6 k_8 k_{10}
\end{aligned}$$

$$\begin{aligned}
& k_{11}^2 k_{14} - k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11} k_{12} k_{13} + k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11} k_{12} k_{14} - k_1^2 k_3 k_4 k_7 \\
& k_8^2 k_{11} k_{13} k_{14} - k_1^2 k_3 k_4 k_7 k_8^2 k_{11} k_{14}^2 - k_1^2 k_3 k_4 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_3 k_4 k_7 k_8 k_{11} k_{12} \\
& k_{14}^2 - k_1^2 k_3 k_4 k_8^2 k_{11}^2 k_{13} k_{14} - k_1^2 k_3 k_4 k_8^2 k_{11}^2 k_{14}^2 + k_1^2 k_4 k_5 k_6 k_7^2 k_8 k_{10} k_{13} - k_1^2 k_4 k_5 k_6 \\
& k_7^2 k_8 k_{12} k_{13} + k_1^2 k_4 k_5 k_6 k_7^2 k_{10} k_{12} k_{13} - k_1^2 k_4 k_5 k_6 k_7^2 k_{12}^2 k_{13} + 2 \\
& k_1^2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13} + k_1^2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{12} k_{13} - k_1^2 k_4 k_5 k_6 k_7 k_8 k_{11} k_{12} k_{13} + \\
& k_1^2 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13} + k_1^2 k_4 k_5 k_6 k_7 k_{10} k_{12}^2 k_{13} + k_1^2 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 k_{13} + \\
& k_1^2 k_4 k_5 k_6 k_8 k_{10} k_{11} k_{12} k_{13} - k_1^2 k_4 k_5 k_7^2 k_8^2 k_{13}^2 - k_1^2 k_4 k_5 k_7^2 k_8^2 k_{13} k_{14} - 2 k_1^2 k_4 k_5 \\
& k_7^2 k_8 k_{12} k_{13}^2 - 2 k_1^2 k_4 k_5 k_7^2 k_8 k_{12} k_{13} k_{14} - k_1^2 k_4 k_5 k_7^2 k_{12}^2 k_{13}^2 - k_1^2 k_4 k_5 k_7^2 k_{12}^2 k_{13} k_{14} - 2 \\
& k_1^2 k_4 k_5 k_7 k_8^2 k_{11}^2 k_{13}^2 - 2 k_1^2 k_4 k_5 k_7 k_8^2 k_{11} k_{13} k_{14} - 2 k_1^2 k_4 k_5 k_7 k_8 k_{11} k_{12} k_{13}^2 - 2 \\
& k_1^2 k_4 k_5 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_4 k_5 k_8^2 k_{11}^2 k_{13}^2 - k_1^2 k_4 k_5 k_8^2 k_{11}^2 k_{13} k_{14} + k_1^2 k_4 k_6^2 \\
& k_7^2 k_8 k_{10} k_{13} - k_1^2 k_4 k_6^2 k_7^2 k_8 k_{12} k_{13} + 2 k_1^2 k_4 k_6^2 k_7 k_8 k_{10} k_{11} k_{13} + k_1^2 k_4 \\
& k_6^2 k_7 k_8 k_{10} k_{12} k_{13} - k_1^2 k_4 k_6^2 k_7 k_8 k_{11} k_{12} k_{13} + k_1^2 k_4 k_6^2 k_8 k_{10} k_{11}^2 k_{13} + k_1^2 k_4 \\
& k_6^2 k_8 k_{10} k_{11} k_{12} k_{13} - k_1^2 k_4 k_6 k_7^2 k_8^2 k_{13}^2 - k_1^2 k_4 k_6 k_7^2 k_8^2 k_{13} k_{14} - k_1^2 k_4 k_6 k_7^2 k_8 k_{12} k_{13}^2 - \\
& k_1^2 k_4 k_6 k_7^2 k_8 k_{12} k_{13} k_{14} - 2 k_1^2 k_4 k_6 k_7 k_8^2 k_{11}^2 k_{13}^2 - 2 k_1^2 k_4 k_6 k_7 k_8^2 k_{11} k_{13} k_{14} - \\
& k_1^2 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13}^2 - k_1^2 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_4 k_6 k_8^2 k_{11}^2 k_{13}^2 - k_1^2 k_4 k_6 k_8^2 \\
& k_{11}^2 k_{13} k_{14} + k_1 k_2 k_3 k_4^2 k_6 k_7 k_8 k_9 k_{12} - k_1 k_2 k_3 k_4^2 k_6 k_7 k_8 k_{11} k_{12} + k_1 k_2 k_3 \\
& k_4^2 k_6 k_7 k_9 k_{11} k_{12} + k_1 k_2 k_3 k_4^2 k_6 k_7 k_9 k_{12}^2 + k_1 k_2 k_3 k_4^2 k_7 k_8^2 k_9 k_{14} - k_1 k_2 k_3 k_4^2 k_7 \\
& k_8^2 k_{11} k_{14} + k_1 k_2 k_3 k_4^2 k_7 k_8 k_9 k_{11} k_{14} + 2 k_1 k_2 k_3 k_4^2 k_7 k_8 k_9 k_{12} k_{14} - k_1 k_2 k_3 \\
& k_4^2 k_7 k_8 k_{11} k_{12} k_{14} + k_1 k_2 k_3 k_4^2 k_7 k_9 k_{11} k_{12} k_{14} + k_1 k_2 k_3 k_4^2 k_7 k_9 k_{12}^2 k_{14} + k_1 k_2 k_3 k_4^2 \\
& k_8^2 k_9 k_{11} k_{14} - k_1 k_2 k_3 k_4^2 k_8^2 k_{11}^2 k_{14} + k_1 k_2 k_3 k_4^2 k_8 k_9 k_{11}^2 k_{14} + k_1 k_2 k_3 k_4^2 k_8 k_9 k_{11} k_{12} k_{14} \\
& - k_1 k_2 k_4^2 k_6^2 k_7^2 k_9 k_{12} - k_1 k_2 k_4^2 k_6^2 k_7^2 k_{12}^2 - k_1 k_2 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} - k_1 k_2 k_4^2 k_6^2 k_7 k_9 k_{12}^2 \\
& - k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_9 k_{14} - k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_{12} k_{13} - 2 k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_{12} k_{14} - k_1 k_2 \\
& k_4^2 k_6 k_7^2 k_9 k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7^2 k_{12}^2 k_{13} - 2 k_1 k_2 k_4^2 k_6 k_7^2 k_{12}^2 k_{14} - 2 k_1 k_2 \\
& k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{14} - k_1 k_2 k_4^2 k_6 k_7 k_8 k_9 k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7 k_8 k_{11} k_{12} k_{13} - 2 k_1 k_2 \\
& k_4^2 k_6 k_7 k_8 k_{11} k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7 k_9 k_{12}^2 k_{14} - k_1 k_2 \\
& k_4^2 k_6 k_8 k_9 k_{11}^2 k_{14} - k_1 k_2 k_4^2 k_6 k_8 k_9 k_{11} k_{12} k_{14} - k_1 k_2 k_4^2 k_7^2 k_8^2 k_{13} k_{14} - k_1 k_2 k_4^2 k_7^2 k_8^2 k_{14}^2 \\
& - 2 k_1 k_2 k_4^2 k_7^2 k_8 k_{12} k_{13} k_{14} - 2 k_1 k_2 k_4^2 k_7^2 k_8 k_{12} k_{14}^2 - k_1 k_2 k_4^2 k_7^2 k_{12}^2 k_{13} k_{14} - k_1 k_2 k_4^2
\end{aligned}$$

$$\begin{aligned}
& k_7^2 k_{12}^2 k_{14}^2 - 2 k_1 k_2 k_4^2 k_7 k_8^2 k_{11} k_{13} k_{14} - 2 k_1 k_2 k_4^2 k_7 k_8^2 k_{11} k_{14}^2 - 2 k_1 k_2 \\
& k_4^2 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_2 k_4^2 k_7 k_8 k_{11} k_{12} k_{14}^2 - k_1 k_2 k_4^2 k_8^2 k_{11} k_{13} k_{14} - k_1 k_2 k_4^2 k_8^2 \\
& k_{11}^2 k_{14}^2 + k_1 k_3^2 k_4^2 k_6 k_7 k_8 k_9 k_{12} - k_1 k_3^2 k_4^2 k_6 k_7 k_8 k_{11} k_{12} + k_1 k_3^2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} + k_1 \\
& k_3^2 k_4^2 k_6 k_7 k_9 k_{12}^2 + k_1 k_3^2 k_4^2 k_7 k_8^2 k_9 k_{14} - k_1 k_3^2 k_4^2 k_7 k_8^2 k_{11} k_{14} + k_1 k_3^2 k_4^2 k_7 k_8 k_9 k_{11} k_{14} \\
& + 2 k_1 k_3^2 k_4^2 k_7 k_8 k_9 k_{12} k_{14} - k_1 k_3^2 k_4^2 k_7 k_8 k_{11} k_{12} k_{14} + k_1 k_3^2 k_4^2 k_7 k_9 k_{11} k_{12} k_{14} + k_1 k_3^2 \\
& k_4^2 k_7 k_9 k_{12}^2 k_{14} - k_1 k_3 k_4^2 k_6^2 k_7^2 k_9 k_{12} - k_1 k_3 k_4^2 k_6^2 k_7^2 k_{12}^2 - k_1 k_3 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} \\
& - k_1 k_3 k_4^2 k_6^2 k_7 k_9 k_{12}^2 - k_1 k_3 k_4^2 k_6^2 k_7^2 k_8 k_9 k_{14} - k_1 k_3 k_4^2 k_6^2 k_7^2 k_8 k_{12} k_{13} - 2 k_1 k_3 k_4^2 k_6^2 \\
& k_7^2 k_8 k_{12} k_{14} - k_1 k_3 k_4^2 k_6^2 k_7^2 k_9 k_{12} k_{14} - k_1 k_3 k_4^2 k_6^2 k_7^2 k_{12}^2 k_{13} - 2 k_1 k_3 k_4^2 k_6^2 k_7^2 k_{12}^2 k_{14} \\
& - k_1 k_3 k_4^2 k_6^2 k_7 k_8 k_9 k_{11} k_{14} + k_1 k_3 k_4^2 k_6^2 k_7 k_8 k_9 k_{12} k_{13} - k_1 k_3 k_4^2 k_6^2 k_7 k_8 k_9 k_{12} k_{14} \\
& - 2 k_1 k_3 k_4^2 k_6^2 k_7 k_8 k_{11} k_{12} k_{13} - k_1 k_3 k_4^2 k_6^2 k_7 k_8 k_{11} k_{12} k_{14} + k_1 k_3 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} k_{13} \\
& - k_1 k_3 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} k_{14} + k_1 k_3 k_4^2 k_6^2 k_7 k_9 k_{12}^2 k_{13} - k_1 k_3 k_4^2 k_6^2 k_7 k_9 k_{12}^2 k_{14} - k_1 k_3 \\
& k_4^2 k_7^2 k_8^2 k_{13} k_{14} - k_1 k_3 k_4^2 k_7^2 k_8^2 k_{14}^2 - 2 k_1 k_3 k_4^2 k_7^2 k_8 k_{12} k_{13} k_{14} - 2 k_1 k_3 k_4^2 k_7^2 k_8 k_{12} k_{14}^2 \\
& - k_1 k_3 k_4^2 k_7^2 k_{12}^2 k_{13} k_{14} - k_1 k_3 k_4^2 k_7^2 k_{12}^2 k_{14}^2 - k_1 k_3 k_4^2 k_7 k_8^2 k_{11} k_{13} k_{14} - k_1 k_3 k_4^2 k_7 \\
& k_8^2 k_{11} k_{14}^2 - k_1 k_3 k_4^2 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - k_1 k_3 k_4^2 k_7 k_8 k_{11} k_{12} k_{14}^2 - k_1 k_4^2 k_6^2 k_7^2 k_9 k_{12} k_{13} \\
& - k_1 k_4^2 k_6^2 k_7^2 k_{12}^2 k_{13} - k_1 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} k_{13} - k_1 k_4^2 k_6^2 k_7 k_9 k_{12}^2 k_{13} - k_1 k_4^2 k_6^2 \\
& k_7^2 k_8 k_{12} k_{13}^2 - k_1 k_4^2 k_6^2 k_7^2 k_8 k_{12} k_{13} k_{14} - k_1 k_4^2 k_6^2 k_7^2 k_{12}^2 k_{13}^2 - k_1 k_4^2 k_6^2 k_7^2 k_{12}^2 k_{13} k_{14} - k_1 \\
& k_4^2 k_6^2 k_7 k_8 k_{11} k_{12} k_{13}^2 - k_1 k_4^2 k_6^2 k_7 k_8 k_{11} k_{12} k_{13} k_{14} \Big) x_4 x_5^2 + \Big(-2 k_1 k_2 k_3 k_4 k_5 k_7 k_8^2 k_9 k_{11} \\
& - 2 k_1 k_2 k_3 k_4 k_5 k_7 k_8^2 k_{10} k_{11} - 2 k_1 k_2 k_3 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} \\
& - 2 k_1 k_2 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{12} - 2 k_1 k_2 k_3 k_4 k_5 k_8^2 k_9 k_{11}^2 - 2 k_1 k_2 k_3 k_4 k_5 k_8^2 k_{10} k_{11}^2 \\
& - 2 k_1 k_2 k_3 k_4 k_6 k_7 k_8^2 k_9 k_{11} - 2 k_1 k_2 k_3 k_4 k_6 k_7 k_8^2 k_{10} k_{11} \\
& - 2 k_1 k_2 k_3 k_4 k_6 k_7 k_8 k_9 k_{11} k_{12} - 2 k_1 k_2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{12} - 2 k_1 k_2 k_3 k_4 k_6 k_8^2 k_9 \\
& k_{11}^2 - 2 k_1 k_2 k_3 k_4 k_6 k_8^2 k_{10} k_{11}^2 - 2 k_1 k_2 k_3 k_4 k_7 k_8^2 k_9 k_{11} k_{14} - 2 k_1 k_2 k_3 k_4 k_7 \\
& k_8^2 k_{10} k_{11} k_{14} - 2 k_1 k_2 k_3 k_4 k_7 k_8 k_9 k_{11} k_{12} k_{14} - 2 k_1 k_2 k_3 k_4 k_7 k_8 k_{10} k_{11} k_{12} k_{14} \\
& - 2 k_1 k_2 k_3 k_4 k_8^2 k_9 k_{11}^2 k_{14} - 2 k_1 k_2 k_3 k_4 k_8^2 k_{10} k_{11}^2 k_{14} - 2 k_1 k_2 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{12} \\
& - 2 k_1 k_2 k_4 k_5 k_6 k_7^2 k_8 k_{10} k_{12} - 2 k_1 k_2 k_4 k_5 k_6 k_7^2 k_9 k_{12}^2 - 2 k_1 k_2 k_4 k_5 k_6 k_7^2 k_{10} k_{12}^2 \\
& - 2 k_1 k_2 k_4 k_5 k_6 k_7 k_8 k_9 k_{11} k_{12} - 2 k_1 k_2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{12} - 2 k_1 k_2 k_4 k_5 k_7^2 \\
& k_8^2 k_9 k_{13} - 2 k_1 k_2 k_4 k_5 k_7^2 k_8^2 k_9 k_{14} - 2 k_1 k_2 k_4 k_5 k_7^2 k_8^2 k_{10} k_{13} - 2 k_1 k_2 k_4 k_5 k_7^2 k_8^2 k_{10} k_{14}
\end{aligned}$$

$$\begin{aligned}
& -4 k_1 k_2 k_4 k_5 k_7^2 k_8 k_9 k_{12} k_{13} - 4 k_1 k_2 k_4 k_5 k_7^2 k_8 k_9 k_{12} k_{14} - 4 k_1 k_2 k_4 k_5 \\
& k_7^2 k_8 k_{10} k_{12} k_{13} - 4 k_1 k_2 k_4 k_5 k_7^2 k_8 k_{10} k_{12} k_{14} - 2 k_1 k_2 k_4 k_5 k_7^2 k_9 k_{12}^2 k_{13} - 2 k_1 k_2 k_4 k_5 \\
& k_7^2 k_9 k_{12}^2 k_{14} - 2 k_1 k_2 k_4 k_5 k_7^2 k_{10} k_{12}^2 k_{13} - 2 k_1 k_2 k_4 k_5 k_7^2 k_{10} k_{12}^2 k_{14} - 4 k_1 k_2 k_4 k_5 k_7 \\
& k_8^2 k_9 k_{11} k_{13} - 4 k_1 k_2 k_4 k_5 k_7 k_8^2 k_9 k_{11} k_{14} - 4 k_1 k_2 k_4 k_5 k_7 k_8^2 k_{10} k_{11} k_{13} \\
& - 4 k_1 k_2 k_4 k_5 k_7 k_8^2 k_{10} k_{11} k_{14} - 4 k_1 k_2 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} k_{13} \\
& - 4 k_1 k_2 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} k_{14} - 4 k_1 k_2 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{12} k_{13} \\
& - 4 k_1 k_2 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_2 k_4 k_5 k_8^2 k_9 k_{11}^2 k_{13} - 2 k_1 k_2 k_4 k_5 k_8^2 k_9 k_{11}^2 k_{14} \\
& - 2 k_1 k_2 k_4 k_5 k_8^2 k_{10} k_{11}^2 k_{13} - 2 k_1 k_2 k_4 k_5 k_8^2 k_{10} k_{11}^2 k_{14} - 2 k_1 k_2 k_4 k_6^2 k_7^2 k_8 k_9 k_{12} \\
& - 2 k_1 k_2 k_4 k_6^2 k_7^2 k_8 k_{10} k_{12} - 2 k_1 k_2 k_4 k_6^2 k_7^2 k_9 k_{12}^2 - 2 k_1 k_2 k_4 k_6^2 k_7^2 k_{10} k_{12}^2 - 2 k_1 k_2 k_4 \\
& k_6^2 k_7 k_8 k_9 k_{11} k_{12} - 2 k_1 k_2 k_4 k_6^2 k_7 k_8 k_{10} k_{11} k_{12} - 2 k_1 k_2 k_4 k_6^2 k_7^2 k_8 k_9 k_{13} \\
& - 2 k_1 k_2 k_4 k_6 k_7^2 k_8^2 k_9 k_{14} - 2 k_1 k_2 k_4 k_6 k_7^2 k_8^2 k_{10} k_{13} - 2 k_1 k_2 k_4 k_6 k_7^2 k_8^2 k_{10} k_{14} \\
& - 4 k_1 k_2 k_4 k_6 k_7^2 k_8 k_9 k_{12} k_{13} - 6 k_1 k_2 k_4 k_6 k_7^2 k_8 k_9 k_{12} k_{14} - 4 k_1 k_2 k_4 k_6 \\
& k_7^2 k_8 k_{10} k_{12} k_{13} - 6 k_1 k_2 k_4 k_6 k_7^2 k_8 k_{10} k_{12} k_{14} - 2 k_1 k_2 k_4 k_6 k_7^2 k_9 k_{12}^2 k_{13} - 4 k_1 k_2 k_4 k_6 \\
& k_7^2 k_9 k_{12}^2 k_{14} - 2 k_1 k_2 k_4 k_6 k_7^2 k_{10} k_{12}^2 k_{13} - 4 k_1 k_2 k_4 k_6 k_7^2 k_{10} k_{12}^2 k_{14} - 4 k_1 k_2 k_4 k_6 k_7 \\
& k_8^2 k_9 k_{11} k_{13} - 4 k_1 k_2 k_4 k_6 k_7 k_8^2 k_9 k_{11} k_{14} - 4 k_1 k_2 k_4 k_6 k_7 k_8^2 k_{10} k_{11} k_{13} \\
& - 4 k_1 k_2 k_4 k_6 k_7 k_8^2 k_{10} k_{11} k_{14} - 4 k_1 k_2 k_4 k_6 k_7 k_8 k_9 k_{11} k_{12} k_{13} \\
& - 6 k_1 k_2 k_4 k_6 k_7 k_8 k_9 k_{11} k_{12} k_{14} - 4 k_1 k_2 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{12} k_{13} \\
& - 6 k_1 k_2 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_2 k_4 k_6 k_8^2 k_9 k_{11}^2 k_{13} - 2 k_1 k_2 k_4 k_6 k_8^2 k_9 k_{11}^2 k_{14} \\
& - 2 k_1 k_2 k_4 k_6 k_8^2 k_{10} k_{11}^2 k_{13} - 2 k_1 k_2 k_4 k_6 k_8^2 k_{10} k_{11}^2 k_{14} - 2 k_1 k_2 k_4 k_7^2 k_8^2 k_9 k_{13} k_{14} \\
& - 2 k_1 k_2 k_4 k_7^2 k_8^2 k_9 k_{14}^2 - 2 k_1 k_2 k_4 k_7^2 k_8^2 k_{10} k_{13} k_{14} - 2 k_1 k_2 k_4 k_7^2 k_8^2 k_{10} k_{14}^2 \\
& - 4 k_1 k_2 k_4 k_7^2 k_8 k_9 k_{12} k_{13} k_{14} - 4 k_1 k_2 k_4 k_7^2 k_8 k_9 k_{12} k_{14}^2 - 4 k_1 k_2 k_4 \\
& k_7^2 k_8 k_{10} k_{12} k_{13} k_{14} - 4 k_1 k_2 k_4 k_7^2 k_8 k_{10} k_{12} k_{14}^2 - 2 k_1 k_2 k_4 k_7^2 k_9 k_{12}^2 k_{13} k_{14} - 2 k_1 k_2 k_4 \\
& k_7^2 k_9 k_{12}^2 k_{14}^2 - 2 k_1 k_2 k_4 k_7^2 k_{10} k_{12}^2 k_{13} k_{14} - 2 k_1 k_2 k_4 k_7^2 k_{10} k_{12}^2 k_{14}^2 - 4 k_1 k_2 k_4 k_7 \\
& k_8^2 k_9 k_{11} k_{13} k_{14} - 4 k_1 k_2 k_4 k_7 k_8^2 k_9 k_{11} k_{14}^2 - 4 k_1 k_2 k_4 k_7 k_8^2 k_{10} k_{11} k_{13} k_{14} \\
& - 4 k_1 k_2 k_4 k_7 k_8^2 k_{10} k_{11} k_{14}^2 - 4 k_1 k_2 k_4 k_7 k_8 k_9 k_{11} k_{12} k_{13} k_{14} \\
& - 4 k_1 k_2 k_4 k_7 k_8 k_9 k_{11} k_{12} k_{14}^2 - 4 k_1 k_2 k_4 k_7 k_8 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - 4 k_1 k_2 k_4 k_7 k_8 k_{10} k_{11} k_{12} k_{14}^2 - 2 k_1 k_2 k_4 k_8^2 k_9 k_{11}^2 k_{13} k_{14} - 2 k_1 k_2 k_4 k_8^2 k_9 k_{11}^2 k_{14}^2
\end{aligned}$$

$$\begin{aligned}
& -2 k_1 k_2 k_4 k_8^2 k_{10} k_{11}^2 k_{13} k_{14} - 2 k_1 k_2 k_4 k_8^2 k_{10} k_{11}^2 k_{14}^2 - 2 k_1 k_3^2 k_4 k_5 k_7 k_8^2 k_9 k_{11} - 2 k_1 \\
& k_3^2 k_4 k_5 k_7 k_8^2 k_{10} k_{11} - 2 k_1 k_3^2 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} - 2 k_1 k_3^2 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{12} - 2 k_1 \\
& k_3^2 k_4 k_5 k_8^2 k_9 k_{11}^2 - 2 k_1 k_3^2 k_4 k_5 k_8^2 k_{10} k_{11}^2 - 2 k_1 k_3^2 k_4 k_6 k_7 k_8^2 k_9 k_{11} - 2 k_1 k_3^2 k_4 k_6 k_7 \\
& k_8^2 k_{10} k_{11} - 2 k_1 k_3^2 k_4 k_6 k_7 k_8 k_9 k_{11} k_{12} - 2 k_1 k_3^2 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{12} - 2 k_1 k_3^2 k_4 k_6 \\
& k_8^2 k_9 k_{11}^2 - 2 k_1 k_3^2 k_4 k_6 k_8^2 k_{10} k_{11}^2 - 2 k_1 k_3^2 k_4 k_7 k_8^2 k_9 k_{11} k_{14} - 2 k_1 k_3^2 k_4 k_7 k_8^2 k_{10} k_{11} k_{14} \\
& - 2 k_1 k_3^2 k_4 k_7 k_8 k_9 k_{11} k_{12} k_{14} - 2 k_1 k_3^2 k_4 k_7 k_8 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_3^2 k_4 k_8^2 k_9 k_{11}^2 k_{14} \\
& - 2 k_1 k_3^2 k_4 k_8^2 k_{10} k_{11}^2 k_{14} - 2 k_1 k_3 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{12} - 2 k_1 k_3 k_4 k_5 k_6 k_7^2 k_8 k_{10} k_{12} \\
& - 2 k_1 k_3 k_4 k_5 k_6 k_7^2 k_9 k_{12}^2 - 2 k_1 k_3 k_4 k_5 k_6 k_7^2 k_{10} k_{12}^2 - 2 k_1 k_3 k_4 k_5 k_6 k_7 k_8 k_9 k_{11} k_{12} \\
& - 2 k_1 k_3 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{12} - 2 k_1 k_3 k_4 k_5 k_7^2 k_8^2 k_9 k_{13} - 2 k_1 k_3 k_4 k_5 k_7^2 k_8^2 k_9 k_{14} \\
& - 2 k_1 k_3 k_4 k_5 k_7^2 k_8^2 k_{10} k_{13} - 2 k_1 k_3 k_4 k_5 k_7^2 k_8^2 k_{10} k_{14} - 4 k_1 k_3 k_4 k_5 k_7^2 k_8 k_9 k_{12} k_{13} \\
& - 4 k_1 k_3 k_4 k_5 k_7^2 k_8 k_9 k_{12} k_{14} - 4 k_1 k_3 k_4 k_5 k_7^2 k_8 k_{10} k_{12} k_{13} - 4 k_1 k_3 k_4 k_5 \\
& k_7^2 k_8 k_{10} k_{12} k_{14} - 2 k_1 k_3 k_4 k_5 k_7^2 k_9 k_{12}^2 k_{13} - 2 k_1 k_3 k_4 k_5 k_7^2 k_9 k_{12}^2 k_{14} - 2 k_1 k_3 k_4 k_5 \\
& k_7^2 k_{10} k_{12}^2 k_{13} - 2 k_1 k_3 k_4 k_5 k_7^2 k_{10} k_{12}^2 k_{14} - 6 k_1 k_3 k_4 k_5 k_7 k_8^2 k_9 k_{11} k_{13} - 4 k_1 k_3 k_4 k_5 k_7 \\
& k_8^2 k_9 k_{11} k_{14} - 6 k_1 k_3 k_4 k_5 k_7 k_8^2 k_{10} k_{11} k_{13} - 4 k_1 k_3 k_4 k_5 k_7 k_8^2 k_{10} k_{11} k_{14} \\
& - 6 k_1 k_3 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} k_{13} - 4 k_1 k_3 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} k_{14} \\
& - 6 k_1 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{12} k_{13} - 4 k_1 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{12} k_{14} - 4 k_1 k_3 k_4 k_5 \\
& k_8^2 k_9 k_{11}^2 k_{13} - 2 k_1 k_3 k_4 k_5 k_8^2 k_9 k_{11}^2 k_{14} - 4 k_1 k_3 k_4 k_5 k_8^2 k_{10} k_{11}^2 k_{13} - 2 k_1 k_3 k_4 k_5 k_8^2 k_{10} \\
& k_{11}^2 k_{14} - 2 k_1 k_3 k_4 k_6^2 k_7^2 k_8 k_9 k_{12} - 2 k_1 k_3 k_4 k_6^2 k_7^2 k_8 k_{10} k_{12} - 2 k_1 k_3 k_4 k_6^2 k_7^2 k_9 k_{12}^2 \\
& - 2 k_1 k_3 k_4 k_6^2 k_7^2 k_{10} k_{12}^2 - 2 k_1 k_3 k_4 k_6^2 k_7 k_8 k_9 k_{11} k_{12} - 2 k_1 k_3 k_4 k_6^2 k_7 k_8 k_{10} k_{11} k_{12} \\
& - 2 k_1 k_3 k_4 k_6 k_7^2 k_8^2 k_9 k_{13} - 2 k_1 k_3 k_4 k_6 k_7^2 k_8^2 k_9 k_{14} - 2 k_1 k_3 k_4 k_6 k_7^2 k_8^2 k_{10} k_{13} \\
& - 2 k_1 k_3 k_4 k_6 k_7^2 k_8^2 k_{10} k_{14} - 4 k_1 k_3 k_4 k_6 k_7^2 k_8 k_9 k_{12} k_{13} - 6 k_1 k_3 k_4 k_6 k_7^2 k_8 k_9 k_{12} k_{14} \\
& - 4 k_1 k_3 k_4 k_6 k_7^2 k_8 k_{10} k_{12} k_{13} - 6 k_1 k_3 k_4 k_6 k_7^2 k_8 k_{10} k_{12} k_{14} - 2 k_1 k_3 k_4 k_6 k_7^2 k_9 k_{12}^2 k_{13} \\
& - 4 k_1 k_3 k_4 k_6 k_7^2 k_9 k_{12}^2 k_{14} - 2 k_1 k_3 k_4 k_6 k_7^2 k_{10} k_{12}^2 k_{13} - 4 k_1 k_3 k_4 k_6 k_7^2 k_{10} k_{12}^2 k_{14} \\
& - 6 k_1 k_3 k_4 k_6 k_7 k_8^2 k_9 k_{11} k_{13} - 4 k_1 k_3 k_4 k_6 k_7 k_8^2 k_9 k_{11} k_{14} - 6 k_1 k_3 k_4 k_6 k_7 \\
& k_8^2 k_{10} k_{11} k_{13} - 4 k_1 k_3 k_4 k_6 k_7 k_8^2 k_{10} k_{11} k_{14} - 6 k_1 k_3 k_4 k_6 k_7 k_8 k_9 k_{11} k_{12} k_{13} \\
& - 6 k_1 k_3 k_4 k_6 k_7 k_8 k_9 k_{11} k_{12} k_{14} - 6 k_1 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{12} k_{13} \\
& - 6 k_1 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{12} k_{14} - 4 k_1 k_3 k_4 k_6 k_8^2 k_9 k_{11}^2 k_{13} - 2 k_1 k_3 k_4 k_6 k_8^2 k_9 k_{11}^2 k_{14}
\end{aligned}$$

$$\begin{aligned}
& -4 k_1 k_3 k_4 k_6 k_8^2 k_{10} k_{11}^2 k_{13} - 2 k_1 k_3 k_4 k_6 k_8^2 k_{10} k_{11}^2 k_{14} - 2 k_1 k_3 k_4 k_7^2 k_8^2 k_9 k_{13} k_{14} \\
& - 2 k_1 k_3 k_4 k_7^2 k_8^2 k_9 k_{14}^2 - 2 k_1 k_3 k_4 k_7^2 k_8^2 k_{10} k_{13} k_{14} - 2 k_1 k_3 k_4 k_7^2 k_8^2 k_{10} k_{14}^2 \\
& - 4 k_1 k_3 k_4 k_7^2 k_8 k_9 k_{12} k_{13} k_{14} - 4 k_1 k_3 k_4 k_7^2 k_8 k_9 k_{12} k_{14}^2 - 4 k_1 k_3 k_4 \\
& k_7^2 k_8 k_{10} k_{12} k_{13} k_{14} - 4 k_1 k_3 k_4 k_7^2 k_8 k_{10} k_{12} k_{14}^2 - 2 k_1 k_3 k_4 k_7^2 k_9 k_{12}^2 k_{13} k_{14} - 2 k_1 k_3 k_4 \\
& k_7^2 k_9 k_{12}^2 k_{14}^2 - 2 k_1 k_3 k_4 k_7^2 k_{10} k_{12}^2 k_{13} k_{14} - 2 k_1 k_3 k_4 k_7^2 k_{10} k_{12}^2 k_{14}^2 - 4 k_1 k_3 k_4 k_7 \\
& k_8^2 k_9 k_{11} k_{13} k_{14} - 4 k_1 k_3 k_4 k_7 k_8^2 k_9 k_{11} k_{14}^2 - 4 k_1 k_3 k_4 k_7 k_8^2 k_{10} k_{11} k_{13} k_{14} \\
& - 4 k_1 k_3 k_4 k_7 k_8^2 k_{10} k_{11} k_{14}^2 - 4 k_1 k_3 k_4 k_7 k_8 k_9 k_{11} k_{12} k_{13} k_{14} \\
& - 4 k_1 k_3 k_4 k_7 k_8 k_9 k_{11} k_{12} k_{14}^2 - 4 k_1 k_3 k_4 k_7 k_8 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - 4 k_1 k_3 k_4 k_7 k_8 k_{10} k_{11} k_{12} k_{14}^2 - 2 k_1 k_3 k_4 k_8^2 k_9 k_{11}^2 k_{13} k_{14} - 2 k_1 k_3 k_4 k_8^2 k_9 k_{11}^2 k_{14}^2 \\
& - 2 k_1 k_3 k_4 k_8^2 k_{10} k_{11}^2 k_{13} k_{14} - 2 k_1 k_3 k_4 k_8^2 k_{10} k_{11}^2 k_{14}^2 - 2 k_1 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{12} k_{13} \\
& - 2 k_1 k_4 k_5 k_6 k_7^2 k_8 k_{10} k_{12} k_{13} - 2 k_1 k_4 k_5 k_6 k_7^2 k_9 k_{12}^2 k_{13} - 2 k_1 k_4 k_5 k_6 k_7^2 k_{10} k_{12}^2 k_{13} \\
& - 2 k_1 k_4 k_5 k_6 k_7 k_8 k_9 k_{11} k_{12} k_{13} - 2 k_1 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{12} k_{13} - 2 k_1 k_4 k_5 k_7^2 k_8^2 k_9 \\
& k_{13}^2 - 2 k_1 k_4 k_5 k_7^2 k_8^2 k_9 k_{13} k_{14} - 2 k_1 k_4 k_5 k_7^2 k_8^2 k_{10} k_{13}^2 - 2 k_1 k_4 k_5 k_7^2 k_8^2 k_{10} k_{13} k_{14} \\
& - 4 k_1 k_4 k_5 k_7^2 k_8 k_9 k_{12} k_{13}^2 - 4 k_1 k_4 k_5 k_7^2 k_8 k_9 k_{12} k_{13} k_{14} - 4 k_1 k_4 k_5 k_7^2 k_8 k_{10} k_{12} k_{13}^2 \\
& - 4 k_1 k_4 k_5 k_7^2 k_8 k_{10} k_{12} k_{13} k_{14} - 2 k_1 k_4 k_5 k_7^2 k_9 k_{12}^2 k_{13}^2 - 2 k_1 k_4 k_5 k_7^2 k_9 k_{12}^2 k_{13} k_{14} \\
& - 2 k_1 k_4 k_5 k_7^2 k_{10} k_{12}^2 k_{13}^2 - 2 k_1 k_4 k_5 k_7^2 k_{10} k_{12}^2 k_{13} k_{14} - 4 k_1 k_4 k_5 k_7 k_8^2 k_9 k_{11} k_{13}^2 \\
& - 4 k_1 k_4 k_5 k_7 k_8^2 k_9 k_{11} k_{13} k_{14} - 4 k_1 k_4 k_5 k_7 k_8^2 k_{10} k_{11} k_{13}^2 - 4 k_1 k_4 k_5 k_7 \\
& k_8^2 k_{10} k_{11} k_{13} k_{14} - 4 k_1 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} k_{13}^2 - 4 k_1 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} k_{13} k_{14} \\
& - 4 k_1 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{12} k_{13}^2 - 4 k_1 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_4 k_5 k_8^2 k_9 k_{11}^2 \\
& k_{13}^2 - 2 k_1 k_4 k_5 k_8^2 k_9 k_{11}^2 k_{13} k_{14} - 2 k_1 k_4 k_5 k_8^2 k_{10} k_{11}^2 k_{13}^2 - 2 k_1 k_4 k_5 k_8^2 k_{10} k_{11}^2 k_{13} k_{14} \\
& - 2 k_1 k_4 k_6^2 k_7^2 k_8 k_9 k_{12} k_{13} - 2 k_1 k_4 k_6^2 k_7^2 k_8 k_{10} k_{12} k_{13} - 2 k_1 k_4 k_6^2 k_7^2 k_9 k_{12}^2 k_{13} \\
& - 2 k_1 k_4 k_6^2 k_7^2 k_{10} k_{12}^2 k_{13} - 2 k_1 k_4 k_6^2 k_7 k_8 k_9 k_{11} k_{12} k_{13} - 2 k_1 k_4 k_6^2 k_7 k_8 k_{10} k_{11} k_{12} k_{13} \\
& - 2 k_1 k_4 k_6 k_7^2 k_8^2 k_9 k_{13}^2 - 2 k_1 k_4 k_6 k_7^2 k_8^2 k_9 k_{13} k_{14} - 2 k_1 k_4 k_6 k_7^2 k_8^2 k_{10} k_{13}^2 - 2 k_1 k_4 k_6 \\
& k_7^2 k_8^2 k_{10} k_{13} k_{14} - 4 k_1 k_4 k_6 k_7^2 k_8 k_9 k_{12} k_{13}^2 - 4 k_1 k_4 k_6 k_7^2 k_8 k_9 k_{12} k_{13} k_{14} - 4 k_1 k_4 k_6 \\
& k_7^2 k_8 k_{10} k_{12} k_{13}^2 - 4 k_1 k_4 k_6 k_7^2 k_8 k_{10} k_{12} k_{13} k_{14} - 2 k_1 k_4 k_6 k_7^2 k_9 k_{12}^2 k_{13}^2 - 2 k_1 k_4 k_6 \\
& k_7^2 k_9 k_{12}^2 k_{13} k_{14} - 2 k_1 k_4 k_6 k_7^2 k_{10} k_{12}^2 k_{13}^2 - 2 k_1 k_4 k_6 k_7^2 k_{10} k_{12}^2 k_{13} k_{14} - 4 k_1 k_4 k_6 k_7 \\
& k_8^2 k_9 k_{11} k_{13}^2 - 4 k_1 k_4 k_6 k_7 k_8^2 k_9 k_{11} k_{13} k_{14} - 4 k_1 k_4 k_6 k_7 k_8^2 k_{10} k_{11} k_{13}^2 - 4 k_1 k_4 k_6 k_7
\end{aligned}$$

$$\begin{aligned}
& k_8^2 k_{10} k_{11} k_{13} k_{14} - 4 k_1 k_4 k_6 k_7 k_8 k_9 k_{11} k_{12} k_{13}^2 - 4 k_1 k_4 k_6 k_7 k_8 k_9 k_{11} k_{12} k_{13} k_{14} \\
& - 4 k_1 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{12} k_{13}^2 - 4 k_1 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_4 k_6 k_8^2 k_9 k_{11}^2 \\
& k_{13}^2 - 2 k_1 k_4 k_6 k_8^2 k_9 k_{11}^2 k_{13} k_{14} - 2 k_1 k_4 k_6 k_8^2 k_{10} k_{11}^2 k_{13}^2 - 2 k_1 k_4 k_6 k_8^2 k_{10} k_{11}^2 k_{13} k_{14} \\
& x_4 x_5 + \left(-k_1 k_2 k_5^2 k_7^2 k_8^2 k_9 k_{10} - k_1 k_2 k_5^2 k_7^2 k_8^2 k_{10}^2 - 2 k_1 k_2 k_5^2 k_7^2 k_8 k_9 k_{10} k_{12} - 2 k_1 k_2 \right. \\
& k_5^2 k_7^2 k_8 k_{10}^2 k_{12} - k_1 k_2 k_5^2 k_7^2 k_9 k_{10} k_{12}^2 - k_1 k_2 k_5^2 k_7^2 k_{10}^2 k_{12}^2 - 2 k_1 k_2 k_5^2 k_7 k_8^2 k_9 k_{10} k_{11} \\
& - 2 k_1 k_2 k_5^2 k_7 k_8^2 k_{10}^2 k_{11} - 2 k_1 k_2 k_5^2 k_7 k_8 k_9 k_{10} k_{11} k_{12} - 2 k_1 k_2 k_5^2 k_7 k_8 k_{10}^2 k_{11} k_{12} \\
& - k_1 k_2 k_5^2 k_8^2 k_9 k_{10} k_{11}^2 - k_1 k_2 k_5^2 k_8^2 k_{10}^2 k_{11}^2 - 2 k_1 k_2 k_5 k_6 k_7^2 k_8^2 k_9 k_{10} - 2 k_1 k_2 k_5 k_6 k_7^2 \\
& k_8^2 k_{10}^2 - 4 k_1 k_2 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{12} - 4 k_1 k_2 k_5 k_6 k_7^2 k_8 k_{10}^2 k_{12} - 2 k_1 k_2 k_5 k_6 k_7^2 k_9 k_{10} \\
& k_{12}^2 - 2 k_1 k_2 k_5 k_6 k_7^2 k_{10}^2 k_{12}^2 - 4 k_1 k_2 k_5 k_6 k_7 k_8^2 k_9 k_{10} k_{11} - 4 k_1 k_2 k_5 k_6 k_7 k_8^2 k_{10}^2 k_{11} \\
& - 4 k_1 k_2 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} - 4 k_1 k_2 k_5 k_6 k_7 k_8 k_{10}^2 k_{11} k_{12} - 2 k_1 k_2 k_5 k_6 k_8^2 k_9 k_{10} \\
& k_{11}^2 - 2 k_1 k_2 k_5 k_6 k_8^2 k_{10}^2 k_{11}^2 - k_1 k_2 k_5 k_7^2 k_8^2 k_9 k_{10} k_{13} - 2 k_1 k_2 k_5 k_7^2 k_8^2 k_9 k_{10} k_{14} \\
& - k_1 k_2 k_5 k_7^2 k_8^2 k_{10}^2 k_{13} - 2 k_1 k_2 k_5 k_7^2 k_8^2 k_{10}^2 k_{14} - 2 k_1 k_2 k_5 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} \\
& - 4 k_1 k_2 k_5 k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - 2 k_1 k_2 k_5 k_7^2 k_8 k_{10}^2 k_{12} k_{13} - 4 k_1 k_2 k_5 k_7^2 k_8 k_{10}^2 k_{12} k_{14} \\
& - k_1 k_2 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{13} - 2 k_1 k_2 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{14} - k_1 k_2 k_5 k_7^2 k_{10}^2 k_{12}^2 k_{13} \\
& - 2 k_1 k_2 k_5 k_7^2 k_{10}^2 k_{12}^2 k_{14} - 2 k_1 k_2 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} - 4 k_1 k_2 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} \\
& - 2 k_1 k_2 k_5 k_7 k_8^2 k_{10}^2 k_{11} k_{13} - 4 k_1 k_2 k_5 k_7 k_8^2 k_{10}^2 k_{11} k_{14} \\
& - 2 k_1 k_2 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} - 4 k_1 k_2 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_2 k_5 k_7 k_8 \\
& k_{10}^2 k_{11} k_{12} k_{13} - 4 k_1 k_2 k_5 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{14} - k_1 k_2 k_5 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - 2 k_1 k_2 k_5 \\
& k_8^2 k_9 k_{10} k_{11}^2 k_{14} - k_1 k_2 k_5 k_8^2 k_{10}^2 k_{11}^2 k_{13} - 2 k_1 k_2 k_5 k_8^2 k_{10}^2 k_{11}^2 k_{14} - k_1 k_2 k_6^2 k_7^2 k_8^2 k_9 k_{10} \\
& - k_1 k_2 k_6^2 k_7^2 k_8^2 k_{10}^2 - 2 k_1 k_2 k_6^2 k_7^2 k_8 k_9 k_{10} k_{12} - 2 k_1 k_2 k_6^2 k_7^2 k_8 k_{10}^2 k_{12} - k_1 k_2 k_6^2 \\
& k_7^2 k_9 k_{10} k_{12}^2 - k_1 k_2 k_6^2 k_7^2 k_{10}^2 k_{12}^2 - 2 k_1 k_2 k_6^2 k_7 k_8^2 k_9 k_{10} k_{11} - 2 k_1 k_2 k_6^2 k_7 k_8^2 k_{10}^2 k_{11} \\
& - 2 k_1 k_2 k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{12} - 2 k_1 k_2 k_6^2 k_7 k_8 k_{10}^2 k_{11} k_{12} - k_1 k_2 k_6^2 k_8^2 k_9 k_{10} k_{11}^2 \\
& - k_1 k_2 k_6^2 k_8^2 k_{10}^2 k_{11}^2 - k_1 k_2 k_6 k_7^2 k_8^2 k_9 k_{10} k_{13} - 2 k_1 k_2 k_6 k_7^2 k_8^2 k_9 k_{10} k_{14} - k_1 k_2 k_6 k_7^2 k_8^2 \\
& k_{10}^2 k_{13} - 2 k_1 k_2 k_6 k_7^2 k_8^2 k_{10}^2 k_{14} - 2 k_1 k_2 k_6 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 4 k_1 k_2 k_6 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - 2 k_1 k_2 k_6 k_7^2 k_8 k_{10}^2 k_{12} k_{13} - 4 k_1 k_2 k_6 k_7^2 k_8 k_{10}^2 k_{12} k_{14} - k_1 k_2 k_6 \\
& k_7^2 k_9 k_{10} k_{12}^2 k_{13} - 2 k_1 k_2 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{14} - k_1 k_2 k_6 k_7^2 k_{10}^2 k_{12}^2 k_{13} - 2 k_1 k_2 k_6 k_7^2 k_{10}^2 \\
& k_{12}^2 k_{14} - 2 k_1 k_2 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} - 4 k_1 k_2 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} - 2 k_1 k_2 k_6 k_7 k_8^2
\end{aligned}$$

$$\begin{aligned}
& k_{10}^2 k_{11} k_{13} - 4 k_1 k_2 k_6 k_7 k_8^2 k_{10}^2 k_{11} k_{14} - 2 k_1 k_2 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} \\
& - 4 k_1 k_2 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_2 k_6 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} - 4 k_1 k_2 k_6 k_7 k_8 \\
& k_{10}^2 k_{11} k_{12} k_{14} - k_1 k_2 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - 2 k_1 k_2 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{14} - k_1 k_2 k_6 k_8^2 k_{10}^2 \\
& k_{11}^2 k_{13} - 2 k_1 k_2 k_6 k_8^2 k_{10}^2 k_{11}^2 k_{14} - k_1 k_2 k_7^2 k_8^2 k_9 k_{10} k_{13} k_{14} - k_1 k_2 k_7^2 k_8^2 k_9 k_{10} k_{14}^2 \\
& - k_1 k_2 k_7^2 k_8^2 k_{10}^2 k_{13} k_{14} - k_1 k_2 k_7^2 k_8^2 k_{10}^2 k_{14}^2 - 2 k_1 k_2 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} k_{14} - 2 k_1 k_2 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{14}^2 - 2 k_1 k_2 k_7^2 k_8 k_{10}^2 k_{12} k_{13} k_{14} - 2 k_1 k_2 k_7^2 k_8 k_{10}^2 k_{12} k_{14}^2 - k_1 k_2 \\
& k_7^2 k_9 k_{10} k_{12}^2 k_{13} k_{14} - k_1 k_2 k_7^2 k_9 k_{10} k_{12}^2 k_{14}^2 - k_1 k_2 k_7^2 k_{10}^2 k_{12}^2 k_{13} k_{14} - k_1 k_2 k_7^2 k_{10}^2 k_{12}^2 k_{14}^2 \\
& - 2 k_1 k_2 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_1 k_2 k_7 k_8^2 k_9 k_{10} k_{11} k_{14}^2 - 2 k_1 k_2 k_7 k_8^2 \\
& k_{10}^2 k_{11} k_{13} k_{14} - 2 k_1 k_2 k_7 k_8^2 k_{10}^2 k_{11} k_{14}^2 - 2 k_1 k_2 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - 2 k_1 k_2 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14}^2 - 2 k_1 k_2 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_2 k_7 k_8 \\
& k_{10}^2 k_{11} k_{12} k_{14}^2 - k_1 k_2 k_8^2 k_9 k_{10} k_{11}^2 k_{13} k_{14} - k_1 k_2 k_8^2 k_9 k_{10} k_{11}^2 k_{14}^2 - k_1 k_2 k_8^2 k_{10}^2 \\
& k_{11}^2 k_{13} k_{14} - k_1 k_2 k_8^2 k_{10}^2 k_{11}^2 k_{14}^2 - k_1 k_3 k_5^2 k_7^2 k_8^2 k_9 k_{10} - k_1 k_3 k_5^2 k_7^2 k_8^2 k_{10}^2 - 2 k_1 k_3 k_5^2 \\
& k_7^2 k_8 k_9 k_{10} k_{12} - 2 k_1 k_3 k_5^2 k_7^2 k_8 k_{10}^2 k_{12} - k_1 k_3 k_5^2 k_7^2 k_9 k_{10} k_{12}^2 - k_1 k_3 k_5^2 k_7^2 k_{10}^2 k_{12}^2 \\
& - 2 k_1 k_3 k_5^2 k_7 k_8^2 k_9 k_{10} k_{11} - 2 k_1 k_3 k_5^2 k_7 k_8^2 k_{10}^2 k_{11} - 2 k_1 k_3 k_5^2 k_7 k_8 k_9 k_{10} k_{11} k_{12} \\
& - 2 k_1 k_3 k_5^2 k_7 k_8 k_{10}^2 k_{11} k_{12} - k_1 k_3 k_5^2 k_8^2 k_9 k_{10} k_{11}^2 - k_1 k_3 k_5^2 k_8^2 k_{10}^2 k_{11}^2 - 2 k_1 k_3 k_5 k_6 \\
& k_7^2 k_8^2 k_9 k_{10} - 2 k_1 k_3 k_5 k_6 k_7^2 k_8^2 k_{10}^2 - 4 k_1 k_3 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{12} - 4 k_1 k_3 k_5 k_6 k_7^2 k_8 \\
& k_{10}^2 k_{12} - 2 k_1 k_3 k_5 k_6 k_7^2 k_9 k_{10} k_{12}^2 - 2 k_1 k_3 k_5 k_6 k_7^2 k_{10}^2 k_{12}^2 - 4 k_1 k_3 k_5 k_6 k_7 k_8^2 k_9 k_{10} k_{11} \\
& - 4 k_1 k_3 k_5 k_6 k_7 k_8^2 k_{10}^2 k_{11} - 4 k_1 k_3 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} - 4 k_1 k_3 k_5 k_6 k_7 k_8 \\
& k_{10}^2 k_{11} k_{12} - 2 k_1 k_3 k_5 k_6 k_8^2 k_9 k_{10} k_{11}^2 - 2 k_1 k_3 k_5 k_6 k_8^2 k_{10}^2 k_{11}^2 - k_1 k_3 k_5 k_7^2 k_8^2 k_9 k_{10} k_{13} \\
& - 2 k_1 k_3 k_5 k_7^2 k_8^2 k_9 k_{10} k_{14} - k_1 k_3 k_5 k_7^2 k_8^2 k_{10}^2 k_{13} - 2 k_1 k_3 k_5 k_7^2 k_8^2 k_{10}^2 k_{14} - 2 k_1 k_3 k_5 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 4 k_1 k_3 k_5 k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - 2 k_1 k_3 k_5 k_7^2 k_8 k_{10}^2 k_{12} k_{13} \\
& - 4 k_1 k_3 k_5 k_7^2 k_8 k_{10}^2 k_{12} k_{14} - k_1 k_3 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{13} - 2 k_1 k_3 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{14} \\
& - k_1 k_3 k_5 k_7^2 k_{10}^2 k_{12}^2 k_{13} - 2 k_1 k_3 k_5 k_7^2 k_{10}^2 k_{12}^2 k_{14} - 2 k_1 k_3 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} \\
& - 4 k_1 k_3 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} - 2 k_1 k_3 k_5 k_7 k_8^2 k_{10}^2 k_{11} k_{13} - 4 k_1 k_3 k_5 k_7 k_8^2 k_{10}^2 k_{11} k_{14} \\
& - 2 k_1 k_3 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} - 4 k_1 k_3 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_3 k_5 k_7 k_8 \\
& k_{10}^2 k_{11} k_{12} k_{13} - 4 k_1 k_3 k_5 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{14} - k_1 k_3 k_5 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - 2 k_1 k_3 k_5 \\
& k_8^2 k_9 k_{10} k_{11}^2 k_{14} - k_1 k_3 k_5 k_8^2 k_{10}^2 k_{11}^2 k_{13} - 2 k_1 k_3 k_5 k_8^2 k_{10}^2 k_{11}^2 k_{14} - k_1 k_3 k_6^2 k_7^2 k_8^2 k_9 k_{10}
\end{aligned}$$

$$\begin{aligned}
& -k_1 k_3 k_6^2 k_7^2 k_8^2 k_{10}^2 - 2k_1 k_3 k_6^2 k_7^2 k_8 k_9 k_{10} k_{12} - 2k_1 k_3 k_6^2 k_7^2 k_8 k_{10}^2 k_{12} - k_1 k_3 k_6^2 \\
& k_7^2 k_9 k_{10} k_{12}^2 - k_1 k_3 k_6^2 k_7^2 k_{10}^2 k_{12}^2 - 2k_1 k_3 k_6^2 k_7 k_8^2 k_9 k_{10} k_{11} - 2k_1 k_3 k_6^2 k_7 k_8^2 k_{10}^2 k_{11} \\
& - 2k_1 k_3 k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{12} - 2k_1 k_3 k_6^2 k_7 k_8 k_{10}^2 k_{11} k_{12} - k_1 k_3 k_6^2 k_8^2 k_9 k_{10} k_{11}^2 \\
& - k_1 k_3 k_6^2 k_8^2 k_{10}^2 k_{11}^2 - k_1 k_3 k_6 k_7^2 k_8^2 k_9 k_{10} k_{13} - 2k_1 k_3 k_6 k_7^2 k_8^2 k_9 k_{10} k_{14} - k_1 k_3 k_6 k_7^2 k_8^2 \\
& k_{10}^2 k_{13} - 2k_1 k_3 k_6 k_7^2 k_8^2 k_{10}^2 k_{14} - 2k_1 k_3 k_6 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 4k_1 k_3 k_6 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - 2k_1 k_3 k_6 k_7^2 k_8 k_{10}^2 k_{12} k_{13} - 4k_1 k_3 k_6 k_7^2 k_8 k_{10}^2 k_{12} k_{14} - k_1 k_3 k_6 \\
& k_7^2 k_9 k_{10} k_{12}^2 k_{13} - 2k_1 k_3 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{14} - k_1 k_3 k_6 k_7^2 k_{10}^2 k_{12}^2 k_{13} - 2k_1 k_3 k_6 k_7^2 k_{10}^2 \\
& k_{12}^2 k_{14} - 2k_1 k_3 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} - 4k_1 k_3 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} - 2k_1 k_3 k_6 k_7 k_8^2 \\
& k_{10}^2 k_{11} k_{13} - 4k_1 k_3 k_6 k_7 k_8^2 k_{10}^2 k_{11} k_{14} - 2k_1 k_3 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} \\
& - 4k_1 k_3 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2k_1 k_3 k_6 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} - 4k_1 k_3 k_6 k_7 k_8 \\
& k_{10}^2 k_{11} k_{12} k_{14} - k_1 k_3 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - 2k_1 k_3 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{14} - k_1 k_3 k_6 k_8^2 k_{10}^2 \\
& k_{11}^2 k_{13} - 2k_1 k_3 k_6 k_8^2 k_{10}^2 k_{11}^2 k_{14} - k_1 k_3 k_7^2 k_8^2 k_9 k_{10} k_{13} k_{14} - k_1 k_3 k_7^2 k_8^2 k_9 k_{10} k_{14}^2 \\
& - k_1 k_3 k_7^2 k_8^2 k_{10}^2 k_{13} k_{14} - k_1 k_3 k_7^2 k_8^2 k_{10}^2 k_{14}^2 - 2k_1 k_3 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} k_{14} - 2k_1 k_3 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{14}^2 - 2k_1 k_3 k_7^2 k_8 k_{10}^2 k_{12} k_{13} k_{14} - 2k_1 k_3 k_7^2 k_8 k_{10}^2 k_{12} k_{14}^2 - k_1 k_3 \\
& k_7^2 k_9 k_{10} k_{12}^2 k_{13} k_{14} - k_1 k_3 k_7^2 k_9 k_{10} k_{12}^2 k_{14}^2 - k_1 k_3 k_7^2 k_{10}^2 k_{12}^2 k_{13} k_{14} - k_1 k_3 k_7^2 k_{10}^2 k_{12}^2 k_{14}^2 \\
& - 2k_1 k_3 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} k_{14} - 2k_1 k_3 k_7 k_8^2 k_9 k_{10} k_{11} k_{14}^2 - 2k_1 k_3 k_7 k_8^2 \\
& k_{10}^2 k_{11} k_{13} k_{14} - 2k_1 k_3 k_7 k_8^2 k_{10}^2 k_{11} k_{14}^2 - 2k_1 k_3 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - 2k_1 k_3 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14}^2 - 2k_1 k_3 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} k_{14} - 2k_1 k_3 k_7 k_8 \\
& k_{10}^2 k_{11} k_{12} k_{14}^2 - k_1 k_3 k_8^2 k_9 k_{10} k_{11}^2 k_{13} k_{14} - k_1 k_3 k_8^2 k_9 k_{10} k_{11}^2 k_{14}^2 - k_1 k_3 k_8^2 k_{10}^2 \\
& k_{11}^2 k_{13} k_{14} - k_1 k_3 k_8^2 k_{10}^2 k_{11}^2 k_{14}^2 - k_1 k_5^2 k_7^2 k_8^2 k_9 k_{10} k_{13} - k_1 k_5^2 k_7^2 k_8^2 k_{10}^2 k_{13} - 2k_1 k_5^2 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 2k_1 k_5^2 k_7^2 k_8 k_{10}^2 k_{12} k_{13} - k_1 k_5^2 k_7^2 k_9 k_{10} k_{12}^2 k_{13} - k_1 k_5^2 k_7^2 k_{10}^2 k_{12}^2 k_{13} \\
& - 2k_1 k_5^2 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} - 2k_1 k_5^2 k_7 k_8^2 k_{10}^2 k_{11} k_{13} - 2k_1 k_5^2 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} \\
& - 2k_1 k_5^2 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} - k_1 k_5^2 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - k_1 k_5^2 k_8^2 k_{10}^2 k_{11}^2 k_{13} - 2k_1 k_5 k_6 \\
& k_7^2 k_8^2 k_9 k_{10} k_{13} - 2k_1 k_5 k_6 k_7^2 k_8^2 k_{10}^2 k_{13} - 4k_1 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 4k_1 k_5 k_6 k_7^2 k_8 \\
& k_{10}^2 k_{12} k_{13} - 2k_1 k_5 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{13} - 2k_1 k_5 k_6 k_7^2 k_{10}^2 k_{12}^2 k_{13} - 4k_1 k_5 k_6 k_7 \\
& k_8^2 k_9 k_{10} k_{11} k_{13} - 4k_1 k_5 k_6 k_7 k_8^2 k_{10}^2 k_{11} k_{13} - 4k_1 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} \\
& - 4k_1 k_5 k_6 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} - 2k_1 k_5 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - 2k_1 k_5 k_6 k_8^2 k_{10}^2 k_{11}^2 k_{13}
\end{aligned}$$

$$\begin{aligned}
& -k_1 k_5 k_7^2 k_8^2 k_9 k_{10} k_{13}^2 - k_1 k_5 k_7^2 k_8^2 k_9 k_{10} k_{13} k_{14} - k_1 k_5 k_7^2 k_8^2 k_{10}^2 k_{13}^2 - k_1 k_5 k_7^2 k_8^2 \\
& k_{10}^2 k_{13} k_{14} - 2 k_1 k_5 k_7^2 k_8^2 k_9 k_{10} k_{12} k_{13}^2 - 2 k_1 k_5 k_7^2 k_8^2 k_9 k_{10} k_{12} k_{13} k_{14} - 2 k_1 k_5 k_7^2 k_8^2 \\
& k_{10}^2 k_{12} k_{13}^2 - 2 k_1 k_5 k_7^2 k_8^2 k_{10}^2 k_{12} k_{13} k_{14} - k_1 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{13}^2 - k_1 k_5 k_7^2 k_9 k_{10} \\
& k_{12}^2 k_{13} k_{14} - k_1 k_5 k_7^2 k_{10}^2 k_{12}^2 k_{13}^2 - k_1 k_5 k_7^2 k_{10}^2 k_{12}^2 k_{13} k_{14} - 2 k_1 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{13}^2 \\
& - 2 k_1 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_1 k_5 k_7 k_8^2 k_{10}^2 k_{11} k_{13}^2 - 2 k_1 k_5 k_7 k_8^2 k_{10}^2 k_{11} k_{13} k_{14} \\
& - 2 k_1 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13}^2 - 2 k_1 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_5 k_7 k_8 \\
& k_{10}^2 k_{11} k_{12} k_{13}^2 - 2 k_1 k_5 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} k_{14} - k_1 k_5 k_8^2 k_9 k_{10} k_{11}^2 k_{13}^2 - k_1 k_5 k_8^2 k_9 k_{10} \\
& k_{11}^2 k_{13} k_{14} - k_1 k_5 k_8^2 k_{10}^2 k_{11}^2 k_{13}^2 - k_1 k_5 k_8^2 k_{10}^2 k_{11}^2 k_{13} k_{14} - k_1 k_6^2 k_7^2 k_8^2 k_9 k_{10} k_{13} - k_1 k_6^2 \\
& k_7^2 k_8^2 k_{10}^2 k_{13} - 2 k_1 k_6^2 k_7^2 k_8^2 k_9 k_{10} k_{12} k_{13} - 2 k_1 k_6^2 k_7^2 k_8^2 k_{10}^2 k_{12} k_{13} - k_1 k_6^2 k_7^2 k_9 k_{10} \\
& k_{12}^2 k_{13} - k_1 k_6^2 k_7^2 k_{10}^2 k_{12}^2 k_{13} - 2 k_1 k_6^2 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} - 2 k_1 k_6^2 k_7 k_8^2 k_{10}^2 k_{11} k_{13} \\
& - 2 k_1 k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_1 k_6^2 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} - k_1 k_6^2 k_8^2 k_9 k_{10} k_{11}^2 k_{13} \\
& - k_1 k_6^2 k_8^2 k_{10}^2 k_{11}^2 k_{13} - k_1 k_6 k_7^2 k_8^2 k_9 k_{10} k_{13}^2 - k_1 k_6 k_7^2 k_8^2 k_9 k_{10} k_{13} k_{14} - k_1 k_6 k_7^2 k_8^2 k_{10}^2 \\
& k_{13} - k_1 k_6 k_7^2 k_8^2 k_{10}^2 k_{13} k_{14} - 2 k_1 k_6 k_7^2 k_8^2 k_9 k_{10} k_{12} k_{13}^2 - 2 k_1 k_6 k_7^2 k_8^2 k_9 k_{10} k_{12} k_{13} k_{14} \\
& - 2 k_1 k_6 k_7^2 k_8^2 k_{10}^2 k_{12} k_{13}^2 - 2 k_1 k_6 k_7^2 k_8^2 k_{10}^2 k_{12} k_{13} k_{14} - k_1 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{13}^2 - k_1 k_6 \\
& k_7^2 k_9 k_{10} k_{12}^2 k_{13} k_{14} - k_1 k_6 k_7^2 k_{10}^2 k_{12}^2 k_{13}^2 - k_1 k_6 k_7^2 k_{10}^2 k_{12}^2 k_{13} k_{14} - 2 k_1 k_6 k_7 \\
& k_8^2 k_9 k_{10} k_{11} k_{13}^2 - 2 k_1 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_1 k_6 k_7 k_8^2 k_{10}^2 k_{11} k_{13}^2 - 2 k_1 k_6 k_7 k_8^2 \\
& k_{10}^2 k_{11} k_{13} k_{14} - 2 k_1 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13}^2 - 2 k_1 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - 2 k_1 k_6 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13}^2 - 2 k_1 k_6 k_7 k_8 k_{10}^2 k_{11} k_{12} k_{13} k_{14} - k_1 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13}^2 \\
& - k_1 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13} k_{14} - k_1 k_6 k_8^2 k_{10}^2 k_{11}^2 k_{13}^2 - k_1 k_6 k_8^2 k_{10}^2 k_{11}^2 k_{13} k_{14} - k_2^2 k_4 k_5 k_7^2 \\
& k_8^2 k_9^2 - k_2^2 k_4 k_5 k_7^2 k_8^2 k_9 k_{10} - 2 k_2^2 k_4 k_5 k_7^2 k_8^2 k_9 k_{12} - 2 k_2^2 k_4 k_5 k_7^2 k_8^2 k_9 k_{10} k_{12} - k_2^2 k_4 k_5 \\
& k_7^2 k_9^2 k_{12}^2 - k_2^2 k_4 k_5 k_7^2 k_9 k_{10} k_{12}^2 - 2 k_2^2 k_4 k_5 k_7 k_8^2 k_9 k_{11} - 2 k_2^2 k_4 k_5 k_7 k_8^2 k_9 k_{10} k_{11} - 2 \\
& k_2^2 k_4 k_5 k_7 k_8 k_9 k_{11} k_{12} - 2 k_2^2 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} - k_2^2 k_4 k_5 k_8^2 k_9^2 k_{11}^2 - k_2^2 k_4 k_5 \\
& k_8^2 k_9 k_{10} k_{11}^2 - k_2^2 k_4 k_6 k_7^2 k_8^2 k_9^2 - k_2^2 k_4 k_6 k_7^2 k_8^2 k_9 k_{10} - 2 k_2^2 k_4 k_6 k_7^2 k_8^2 k_9 k_{12} - 2 k_2^2 k_4 k_6 \\
& k_7^2 k_8^2 k_9 k_{10} k_{12} - k_2^2 k_4 k_6 k_7^2 k_9^2 k_{12}^2 - k_2^2 k_4 k_6 k_7^2 k_9 k_{10} k_{12}^2 - 2 k_2^2 k_4 k_6 k_7 k_8^2 k_9^2 k_{11} - 2 \\
& k_2^2 k_4 k_6 k_7 k_8^2 k_9 k_{10} k_{11} - 2 k_2^2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{12} - 2 k_2^2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} - \\
& k_2^2 k_4 k_6 k_8^2 k_9^2 k_{11}^2 - k_2^2 k_4 k_6 k_8^2 k_9 k_{10} k_{11}^2 - k_2^2 k_4 k_7^2 k_8^2 k_9^2 k_{14} - k_2^2 k_4 k_7^2 k_8^2 k_9 k_{10} k_{14} - 2 \\
& k_2^2 k_4 k_7^2 k_8^2 k_9 k_{12} k_{14} - 2 k_2^2 k_4 k_7^2 k_8^2 k_9 k_{10} k_{12} k_{14} - k_2^2 k_4 k_7^2 k_9^2 k_{12}^2 k_{14} - k_2^2 k_4 k_7^2 k_9 k_{10}
\end{aligned}$$

$$\begin{aligned}
& k_{12}^2 k_{14} - 2 k_2^2 k_4 k_7 k_8^2 k_9^2 k_{11} k_{14} - 2 k_2^2 k_4 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} - 2 k_2^2 k_4 k_7 k_8 k_9^2 k_{11} k_{12} k_{14} \\
& - 2 k_2^2 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - k_2^2 k_4 k_8^2 k_9^2 k_{11}^2 k_{14} - k_2^2 k_4 k_8^2 k_9 k_{10} k_{11}^2 k_{14} \\
& - 2 k_2 k_3 k_4 k_5 k_7^2 k_8^2 k_9^2 - 2 k_2 k_3 k_4 k_5 k_7^2 k_8^2 k_9 k_{10} - 4 k_2 k_3 k_4 k_5 k_7^2 k_8 k_9^2 k_{12} \\
& - 4 k_2 k_3 k_4 k_5 k_7^2 k_8 k_9 k_{10} k_{12} - 2 k_2 k_3 k_4 k_5 k_7^2 k_9^2 k_{12}^2 - 2 k_2 k_3 k_4 k_5 k_7^2 k_9 k_{10} k_{12}^2 \\
& - 4 k_2 k_3 k_4 k_5 k_7 k_8^2 k_9^2 k_{11} - 4 k_2 k_3 k_4 k_5 k_7 k_8^2 k_9 k_{10} k_{11} - 4 k_2 k_3 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{12} \\
& - 4 k_2 k_3 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} - 2 k_2 k_3 k_4 k_5 k_8^2 k_9^2 k_{11}^2 - 2 k_2 k_3 k_4 k_5 k_8^2 k_9 k_{10} k_{11}^2 \\
& - 2 k_2 k_3 k_4 k_6 k_7^2 k_8^2 k_9^2 - 2 k_2 k_3 k_4 k_6 k_7^2 k_8^2 k_9 k_{10} - 4 k_2 k_3 k_4 k_6 k_7^2 k_8 k_9^2 k_{12} \\
& - 4 k_2 k_3 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{12} - 2 k_2 k_3 k_4 k_6 k_7^2 k_9^2 k_{12}^2 - 2 k_2 k_3 k_4 k_6 k_7^2 k_9 k_{10} k_{12}^2 \\
& - 4 k_2 k_3 k_4 k_6 k_7 k_8^2 k_9^2 k_{11} - 4 k_2 k_3 k_4 k_6 k_7 k_8^2 k_9 k_{10} k_{11} - 4 k_2 k_3 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{12} \\
& - 4 k_2 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} - 2 k_2 k_3 k_4 k_6 k_8^2 k_9^2 k_{11}^2 - 2 k_2 k_3 k_4 k_6 k_8^2 k_9 k_{10} k_{11}^2 \\
& - 2 k_2 k_3 k_4 k_7^2 k_8^2 k_9^2 k_{14} - 2 k_2 k_3 k_4 k_7^2 k_8^2 k_9 k_{10} k_{14} - 4 k_2 k_3 k_4 k_7^2 k_8 k_9^2 k_{12} k_{14} \\
& - 4 k_2 k_3 k_4 k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - 2 k_2 k_3 k_4 k_7^2 k_9^2 k_{12}^2 k_{14} - 2 k_2 k_3 k_4 k_7^2 k_9 k_{10} k_{12}^2 k_{14} \\
& - 4 k_2 k_3 k_4 k_7 k_8^2 k_9^2 k_{11} k_{14} - 4 k_2 k_3 k_4 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} - 4 k_2 k_3 k_4 k_7 k_8 k_9^2 k_{11} k_{12} k_{14} \\
& - 4 k_2 k_3 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_2 k_3 k_4 k_8^2 k_9^2 k_{11}^2 k_{14} - 2 k_2 k_3 k_4 k_8^2 k_9 k_{10} k_{11}^2 k_{14} \\
& - 2 k_2 k_4 k_5 k_7^2 k_8^2 k_9^2 k_{13} - k_2 k_4 k_5 k_7^2 k_8^2 k_9 k_{14} - 2 k_2 k_4 k_5 k_7^2 k_8^2 k_9 k_{10} k_{13} - k_2 k_4 k_5 k_7^2 \\
& k_8^2 k_9 k_{10} k_{14} - 4 k_2 k_4 k_5 k_7^2 k_8 k_9^2 k_{12} k_{13} - 2 k_2 k_4 k_5 k_7^2 k_8 k_9^2 k_{12} k_{14} - 4 k_2 k_4 k_5 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 2 k_2 k_4 k_5 k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - 2 k_2 k_4 k_5 k_7^2 k_9^2 k_{12}^2 k_{13} - k_2 k_4 k_5 k_7^2 \\
& k_9^2 k_{12}^2 k_{14} - 2 k_2 k_4 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{13} - k_2 k_4 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{14} - 4 k_2 k_4 k_5 k_7 k_8^2 \\
& k_9^2 k_{11} k_{13} - 2 k_2 k_4 k_5 k_7 k_8^2 k_9^2 k_{11} k_{14} - 4 k_2 k_4 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} - 2 k_2 k_4 k_5 k_7 \\
& k_8^2 k_9 k_{10} k_{11} k_{14} - 4 k_2 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{12} k_{13} - 2 k_2 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{12} k_{14} \\
& - 4 k_2 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_2 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_2 k_4 k_5 k_8^2 k_9^2 \\
& k_{11}^2 k_{13} - k_2 k_4 k_5 k_8^2 k_9^2 k_{11}^2 k_{14} - 2 k_2 k_4 k_5 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - k_2 k_4 k_5 k_8^2 k_9 k_{10} k_{11}^2 k_{14} \\
& - 2 k_2 k_4 k_6 k_7^2 k_8^2 k_9^2 k_{13} - k_2 k_4 k_6 k_7^2 k_8^2 k_9 k_{14} - 2 k_2 k_4 k_6 k_7^2 k_8^2 k_9 k_{10} k_{13} - k_2 k_4 k_6 k_7^2 \\
& k_8^2 k_9 k_{10} k_{14} - 4 k_2 k_4 k_6 k_7^2 k_8 k_9^2 k_{12} k_{13} - 2 k_2 k_4 k_6 k_7^2 k_8 k_9^2 k_{12} k_{14} - 4 k_2 k_4 k_6 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 2 k_2 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - 2 k_2 k_4 k_6 k_7^2 k_9^2 k_{12}^2 k_{13} - k_2 k_4 k_6 k_7^2 \\
& k_9^2 k_{12}^2 k_{14} - 2 k_2 k_4 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{13} - k_2 k_4 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{14} - 4 k_2 k_4 k_6 k_7 k_8^2 \\
& k_9^2 k_{11} k_{13} - 2 k_2 k_4 k_6 k_7 k_8^2 k_9^2 k_{11} k_{14} - 4 k_2 k_4 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} - 2 k_2 k_4 k_6 k_7 \\
\end{aligned}$$

$$\begin{aligned}
& k_8^2 k_9 k_{10} k_{11} k_{14} - 4 k_2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{12} k_{13} - 2 k_2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{12} k_{14} \\
& - 4 k_2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_2 k_4 k_6 k_8^2 k_9^2 \\
& k_{11}^2 k_{13} - k_2 k_4 k_6 k_8^2 k_9^2 k_{11}^2 k_{14} - 2 k_2 k_4 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - k_2 k_4 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{14} \\
& - k_2 k_4 k_7^2 k_8^2 k_9^2 k_{13} k_{14} - k_2 k_4 k_7^2 k_8^2 k_9^2 k_{14}^2 - k_2 k_4 k_7^2 k_8^2 k_9 k_{10} k_{13} k_{14} - k_2 k_4 k_7^2 k_8^2 k_9 k_{10} \\
& k_{14}^2 - 2 k_2 k_4 k_7^2 k_8 k_9^2 k_{12} k_{13} k_{14} - 2 k_2 k_4 k_7^2 k_8 k_9^2 k_{12} k_{14}^2 - 2 k_2 k_4 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} k_{14} \\
& - 2 k_2 k_4 k_7^2 k_8 k_9 k_{10} k_{12} k_{14}^2 - k_2 k_4 k_7^2 k_9^2 k_{12}^2 k_{13} k_{14} - k_2 k_4 k_7^2 k_9^2 k_{12}^2 k_{14}^2 - k_2 k_4 \\
& k_7^2 k_9 k_{10} k_{12}^2 k_{13} k_{14} - k_2 k_4 k_7^2 k_9 k_{10} k_{12}^2 k_{14}^2 - 2 k_2 k_4 k_7 k_8^2 k_9^2 k_{11} k_{13} k_{14} - 2 k_2 k_4 k_7 k_8^2 \\
& k_9^2 k_{11} k_{14}^2 - 2 k_2 k_4 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_2 k_4 k_7 k_8^2 k_9 k_{10} k_{11} k_{14}^2 - 2 k_2 k_4 k_7 k_8 \\
& k_9^2 k_{11} k_{12} k_{13} k_{14} - 2 k_2 k_4 k_7 k_8 k_9^2 k_{11} k_{12} k_{14}^2 - 2 k_2 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - 2 k_2 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14}^2 - k_2 k_4 k_8^2 k_9^2 k_{11}^2 k_{13} k_{14} - k_2 k_4 k_8^2 k_9^2 k_{11}^2 k_{14}^2 - k_2 k_4 \\
& k_8^2 k_9 k_{10} k_{11}^2 k_{13} k_{14} - k_2 k_4 k_8^2 k_9 k_{10} k_{11}^2 k_{14}^2 - k_3^2 k_4 k_5 k_7^2 k_8^2 k_9^2 - k_3^2 k_4 k_5 k_7^2 k_8^2 k_9 k_{10} - 2 \\
& k_3^2 k_4 k_5 k_7^2 k_8^2 k_9^2 k_{12} - 2 k_3^2 k_4 k_5 k_7^2 k_8 k_9 k_{10} k_{12} - k_3^2 k_4 k_5 k_7^2 k_9^2 k_{12}^2 - k_3^2 k_4 k_5 k_7^2 k_9 k_{10} k_{12}^2 \\
& - 2 k_3^2 k_4 k_5 k_7 k_8^2 k_9^2 k_{11} - 2 k_3^2 k_4 k_5 k_7 k_8^2 k_9 k_{10} k_{11} - 2 k_3^2 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{12} - 2 \\
& k_3^2 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} - k_3^2 k_4 k_5 k_8^2 k_9^2 k_{11}^2 - k_3^2 k_4 k_5 k_8^2 k_9 k_{10} k_{11}^2 - k_3^2 k_4 k_6 k_7^2 k_8^2 k_9^2 \\
& - k_3^2 k_4 k_6 k_7^2 k_8^2 k_9 k_{10} - 2 k_3^2 k_4 k_6 k_7^2 k_8 k_9^2 k_{12} - 2 k_3^2 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{12} - k_3^2 k_4 k_6 k_7^2 k_9^2 \\
& k_{12}^2 - k_3^2 k_4 k_6 k_7^2 k_9 k_{10} k_{12}^2 - 2 k_3^2 k_4 k_6 k_7 k_8^2 k_9^2 k_{11} - 2 k_3^2 k_4 k_6 k_7 k_8^2 k_9 k_{10} k_{11} - 2 \\
& k_3^2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{12} - 2 k_3^2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} - k_3^2 k_4 k_6 k_8^2 k_9^2 k_{11}^2 - k_3^2 k_4 k_6 \\
& k_8^2 k_9 k_{10} k_{11}^2 - k_3^2 k_4 k_7^2 k_8^2 k_9^2 k_{14} - k_3^2 k_4 k_7^2 k_8^2 k_9 k_{10} k_{14} - 2 k_3^2 k_4 k_7^2 k_8 k_9^2 k_{12} k_{14} - 2 k_3^2 k_4 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - k_3^2 k_4 k_7^2 k_9^2 k_{12}^2 k_{14} - k_3^2 k_4 k_7^2 k_9 k_{10} k_{12}^2 k_{14} - 2 k_3^2 k_4 k_7 k_8^2 k_9^2 k_{11} k_{14} \\
& - 2 k_3^2 k_4 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} - 2 k_3^2 k_4 k_7 k_8 k_9^2 k_{11} k_{12} k_{14} - 2 k_3^2 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} \\
& - k_3^2 k_4 k_8^2 k_9^2 k_{11}^2 k_{14} - k_3^2 k_4 k_8^2 k_9 k_{10} k_{11}^2 k_{14} - 2 k_3 k_4 k_5 k_7^2 k_8^2 k_9^2 k_{13} - k_3 k_4 k_5 k_7^2 k_8^2 \\
& k_{14}^2 - 2 k_3 k_4 k_5 k_7^2 k_8^2 k_9 k_{10} k_{13} - k_3 k_4 k_5 k_7^2 k_8^2 k_9 k_{10} k_{14} - 4 k_3 k_4 k_5 k_7^2 k_8 k_9^2 k_{12} k_{13} \\
& - 2 k_3 k_4 k_5 k_7^2 k_8 k_9^2 k_{12} k_{14} - 4 k_3 k_4 k_5 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 2 k_3 k_4 k_5 k_7^2 k_8 k_9 k_{10} k_{12} k_{14} \\
& - 2 k_3 k_4 k_5 k_7^2 k_9^2 k_{12}^2 k_{13} - k_3 k_4 k_5 k_7^2 k_9^2 k_{12}^2 k_{14} - 2 k_3 k_4 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{13} - k_3 k_4 k_5 \\
& k_7^2 k_9 k_{10} k_{12}^2 k_{14} - 4 k_3 k_4 k_5 k_7 k_8^2 k_9^2 k_{11} k_{13} - 2 k_3 k_4 k_5 k_7 k_8^2 k_9^2 k_{11} k_{14} - 4 k_3 k_4 k_5 k_7 \\
& k_8^2 k_9 k_{10} k_{11} k_{13} - 2 k_3 k_4 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} - 4 k_3 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{12} k_{13} \\
& - 2 k_3 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{12} k_{14} - 4 k_3 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13}
\end{aligned}$$

$$\begin{aligned}
& -2 k_3 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_3 k_4 k_5 k_8^2 k_9^2 k_{11}^2 k_{13} - k_3 k_4 k_5 k_8^2 k_9^2 k_{11}^2 k_{14} \\
& - 2 k_3 k_4 k_5 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - k_3 k_4 k_5 k_8^2 k_9 k_{10} k_{11}^2 k_{14} - 2 k_3 k_4 k_6 k_7^2 k_8^2 k_9^2 k_{13} \\
& - k_3 k_4 k_6 k_7^2 k_8^2 k_9^2 k_{14} - 2 k_3 k_4 k_6 k_7^2 k_8^2 k_9 k_{10} k_{13} - k_3 k_4 k_6 k_7^2 k_8^2 k_9 k_{10} k_{14} - 4 k_3 k_4 k_6 \\
& k_7^2 k_8^2 k_{12} k_{13} - 2 k_3 k_4 k_6 k_7^2 k_8^2 k_9 k_{12} k_{14} - 4 k_3 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} - 2 k_3 k_4 k_6 \\
& k_7^2 k_8 k_9 k_{10} k_{12} k_{14} - 2 k_3 k_4 k_6 k_7^2 k_9^2 k_{12}^2 k_{13} - k_3 k_4 k_6 k_7^2 k_9^2 k_{12}^2 k_{14} - 2 k_3 k_4 k_6 k_7^2 k_9 k_{10} \\
& k_{12}^2 k_{13} - k_3 k_4 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{14} - 4 k_3 k_4 k_6 k_7 k_8^2 k_9^2 k_{11} k_{13} - 2 k_3 k_4 k_6 k_7 k_8^2 k_9^2 k_{11} k_{14} \\
& - 4 k_3 k_4 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} - 2 k_3 k_4 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{14} - 4 k_3 k_4 k_6 k_7 k_8 \\
& k_9^2 k_{11} k_{12} k_{13} - 2 k_3 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{12} k_{14} - 4 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} \\
& - 2 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_3 k_4 k_6 k_8^2 k_9^2 k_{11}^2 k_{13} - k_3 k_4 k_6 k_8^2 k_9^2 k_{11}^2 k_{14} \\
& - 2 k_3 k_4 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13} - k_3 k_4 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{14} - k_3 k_4 k_7^2 k_8^2 k_9^2 k_{13} k_{14} - k_3 k_4 k_7^2 \\
& k_8^2 k_9^2 k_{14} - k_3 k_4 k_7^2 k_8^2 k_9 k_{10} k_{13} k_{14} - k_3 k_4 k_7^2 k_8^2 k_9 k_{10} k_{14}^2 - 2 k_3 k_4 k_7^2 k_8 k_9^2 k_{12} k_{13} k_{14} \\
& - 2 k_3 k_4 k_7^2 k_8 k_9^2 k_{12}^2 k_{14} - 2 k_3 k_4 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} k_{14} - 2 k_3 k_4 k_7^2 k_8 k_9 k_{10} k_{12} k_{14}^2 \\
& - k_3 k_4 k_7^2 k_9^2 k_{12}^2 k_{13} k_{14} - k_3 k_4 k_7^2 k_9^2 k_{12}^2 k_{14}^2 - k_3 k_4 k_7^2 k_9 k_{10} k_{12}^2 k_{13} k_{14} - k_3 k_4 k_7^2 k_9 k_{10} \\
& k_{12}^2 k_{14}^2 - 2 k_3 k_4 k_7 k_8^2 k_9^2 k_{11} k_{13} k_{14} - 2 k_3 k_4 k_7 k_8^2 k_9^2 k_{11} k_{14}^2 - 2 k_3 k_4 k_7 \\
& k_8^2 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_3 k_4 k_7 k_8^2 k_9 k_{10} k_{11} k_{14}^2 - 2 k_3 k_4 k_7 k_8 k_9^2 k_{11} k_{12} k_{13} k_{14} \\
& - 2 k_3 k_4 k_7 k_8 k_9^2 k_{11} k_{12} k_{14}^2 - 2 k_3 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - 2 k_3 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{14}^2 - k_3 k_4 k_8^2 k_9^2 k_{11}^2 k_{13} k_{14} - k_3 k_4 k_8^2 k_9^2 k_{11}^2 k_{14}^2 - k_3 k_4 \\
& k_8^2 k_9 k_{10} k_{11}^2 k_{13} k_{14} - k_3 k_4 k_8^2 k_9 k_{10} k_{11}^2 k_{14}^2 - k_4 k_5 k_7^2 k_8^2 k_9^2 k_{13}^2 - k_4 k_5 k_7^2 k_8^2 k_9^2 k_{13} k_{14} \\
& - k_4 k_5 k_7^2 k_8^2 k_9 k_{10} k_{13}^2 - k_4 k_5 k_7^2 k_8^2 k_9 k_{10} k_{13} k_{14} - 2 k_4 k_5 k_7^2 k_8 k_9^2 k_{12} k_{13}^2 - 2 k_4 k_5 \\
& k_7^2 k_8 k_9^2 k_{12} k_{13} k_{14} - 2 k_4 k_5 k_7^2 k_8 k_9 k_{10} k_{12} k_{13}^2 - 2 k_4 k_5 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} k_{14} - k_4 k_5 k_7^2 \\
& k_9^2 k_{12}^2 k_{13}^2 - k_4 k_5 k_7^2 k_9^2 k_{12}^2 k_{13} k_{14} - k_4 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{13}^2 - k_4 k_5 k_7^2 k_9 k_{10} k_{12}^2 k_{13} k_{14} \\
& - 2 k_4 k_5 k_7 k_8^2 k_9^2 k_{11} k_{13}^2 - 2 k_4 k_5 k_7 k_8^2 k_9^2 k_{11} k_{13} k_{14} - 2 k_4 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{13}^2 \\
& - 2 k_4 k_5 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{12} k_{13}^2 - 2 k_4 k_5 k_7 k_8 \\
& k_9^2 k_{11} k_{12} k_{13} k_{14} - 2 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13}^2 - 2 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - k_4 k_5 k_8^2 k_9^2 k_{11}^2 k_{13}^2 - k_4 k_5 k_8^2 k_9^2 k_{11}^2 k_{13} k_{14} - k_4 k_5 k_8^2 k_9 k_{10} k_{11}^2 k_{13}^2 - k_4 k_5 k_8^2 k_9 k_{10} \\
& k_{11}^2 k_{13} k_{14} - k_4 k_6 k_7^2 k_8^2 k_9^2 k_{13}^2 - k_4 k_6 k_7^2 k_8^2 k_9 k_{13} k_{14} - k_4 k_6 k_7^2 k_8^2 k_9 k_{10} k_{13}^2 - k_4 k_6 k_7^2 \\
& k_8^2 k_9 k_{10} k_{13} k_{14} - 2 k_4 k_6 k_7^2 k_8 k_9^2 k_{12} k_{13}^2 - 2 k_4 k_6 k_7^2 k_8 k_9^2 k_{12} k_{13} k_{14} - 2 k_4 k_6
\end{aligned}$$

$$\begin{aligned}
& k_7^2 k_8 k_9 k_{10} k_{12} k_{13}^2 - 2 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{12} k_{13} k_{14} - k_4 k_6 k_7^2 k_9^2 k_{12}^2 k_{13}^2 - k_4 k_6 k_7^2 k_9^2 \\
& k_{12}^2 k_{13} k_{14} - k_4 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{13}^2 - k_4 k_6 k_7^2 k_9 k_{10} k_{12}^2 k_{13} k_{14} - 2 k_4 k_6 k_7 k_8^2 k_9^2 k_{11} k_{13}^2 \\
& - 2 k_4 k_6 k_7 k_8^2 k_9^2 k_{11} k_{13} k_{14} - 2 k_4 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{13}^2 - 2 k_4 k_6 k_7 k_8^2 k_9 k_{10} k_{11} k_{13} k_{14} \\
& - 2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{12} k_{13}^2 - 2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{12} k_{13} k_{14} - 2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} \\
& k_{13}^2 - 2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - k_4 k_6 k_8^2 k_9^2 k_{11}^2 k_{13}^2 - k_4 k_6 k_8^2 k_9^2 k_{11}^2 k_{13} k_{14} \\
& - k_4 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13}^2 - k_4 k_6 k_8^2 k_9 k_{10} k_{11}^2 k_{13} k_{14} \Big) x_4 + \Big(-k_1^2 k_3^2 k_4^2 k_6^2 k_{11}^2 - k_1^2 k_3^2 k_4^2 \\
& k_6^2 k_{11} k_{12} - k_1^2 k_3^2 k_4^2 k_6 k_8 k_{11}^2 - k_1^2 k_3^2 k_4^2 k_6 k_8 k_{11} k_{14} - 2 k_1^2 k_3^2 k_4^2 k_6 k_{11}^2 k_{14} - 2 k_1^2 k_3^2 \\
& k_4^2 k_6 k_{11} k_{12} k_{14} - k_1^2 k_3^2 k_4^2 k_8 k_{11}^2 k_{14} - k_1^2 k_3^2 k_4^2 k_8 k_{11} k_{14}^2 - k_1^2 k_3^2 k_4^2 k_{11}^2 k_{14}^2 - k_1^2 k_3^2 \\
& k_4^2 k_{11} k_{12} k_{14}^2 - k_1^2 k_3 k_4^2 k_6^2 k_7 k_{11} k_{12} - 2 k_1^2 k_3 k_4^2 k_6^2 k_7 k_{11} k_{13} - k_1^2 k_3 k_4^2 k_6^2 k_7 k_{12} k_{13} - 2 \\
& k_1^2 k_3 k_4^2 k_6^2 k_{11}^2 k_{13} - 2 k_1^2 k_3 k_4^2 k_6^2 k_{11} k_{12} k_{13} - 2 k_1^2 k_3 k_4^2 k_6 k_7 k_8 k_{11} k_{13} - k_1^2 k_3 \\
& k_4^2 k_6 k_7 k_8 k_{11} k_{14} - k_1^2 k_3 k_4^2 k_6 k_7 k_8 k_{13} k_{14} - k_1^2 k_3 k_4^2 k_6 k_7 k_{11} k_{12} k_{13} - 2 k_1^2 k_3 \\
& k_4^2 k_6 k_7 k_{11} k_{12} k_{14} - 2 k_1^2 k_3 k_4^2 k_6 k_7 k_{11} k_{13} k_{14} - k_1^2 k_3 k_4^2 k_6 k_7 k_{12} k_{13} k_{14} - 2 k_1^2 k_3 \\
& k_4^2 k_6 k_8 k_{11}^2 k_{13} - k_1^2 k_3 k_4^2 k_6 k_8 k_{11}^2 k_{14} - k_1^2 k_3 k_4^2 k_6 k_8 k_{11} k_{13} k_{14} - 2 k_1^2 k_3 k_4^2 k_6 \\
& k_{11}^2 k_{13} k_{14} - 2 k_1^2 k_3 k_4^2 k_6 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_3 k_4^2 k_7 k_8 k_{11} k_{13} k_{14} - k_1^2 k_3 k_4^2 k_7 k_8 k_{11} k_{14}^2 \\
& - k_1^2 k_3 k_4^2 k_7 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_3 k_4^2 k_7 k_{11} k_{12} k_{14}^2 - k_1^2 k_3 k_4^2 k_8 k_{11}^2 k_{13} k_{14} - k_1^2 k_3 k_4^2 k_8 \\
& k_{11}^2 k_{14}^2 - k_1^2 k_4^2 k_6^2 k_7^2 k_{12} k_{13} - k_1^2 k_4^2 k_6^2 k_7^2 k_{13}^2 - k_1^2 k_4^2 k_6^2 k_7 k_{11} k_{12} k_{13} - 2 k_1^2 k_4^2 k_6^2 k_7 k_{11} \\
& k_{13}^2 - k_1^2 k_4^2 k_6^2 k_7 k_{12} k_{13}^2 - k_1^2 k_4^2 k_6^2 k_{11}^2 k_{13}^2 - k_1^2 k_4^2 k_6^2 k_{11} k_{12} k_{13}^2 - k_1^2 k_4^2 k_6 k_7^2 k_8 k_{13}^2 - k_1^2 \\
& k_4^2 k_6 k_7^2 k_8 k_{13} k_{14} - k_1^2 k_4^2 k_6 k_7^2 k_{12} k_{13}^2 - k_1^2 k_4^2 k_6 k_7^2 k_{12} k_{13} k_{14} - 2 k_1^2 k_4^2 k_6 k_7 k_8 k_{11} k_{13}^2 \\
& - 2 k_1^2 k_4^2 k_6 k_7 k_8 k_{11} k_{13} k_{14} - k_1^2 k_4^2 k_6 k_7 k_{11} k_{12} k_{13}^2 - k_1^2 k_4^2 k_6 k_7 k_{11} k_{12} k_{13} k_{14} - k_1^2 \\
& k_4^2 k_6 k_8 k_{11}^2 k_{13}^2 - k_1^2 k_4^2 k_6 k_8 k_{11}^2 k_{13} k_{14} \Big) x_5^4 + \Big(-k_1^2 k_3^2 k_4 k_5 k_6 k_8 k_{10} k_{11} - k_1^2 \\
& k_3^2 k_4 k_5 k_6 k_8 k_{11}^2 - 2 k_1^2 k_3^2 k_4 k_5 k_6 k_{10} k_{11}^2 - 2 k_1^2 k_3^2 k_4 k_5 k_6 k_{10} k_{11} k_{12} - k_1^2 k_3^2 k_4 k_5 k_8 k_{10} \\
& k_{11}^2 - 2 k_1^2 k_3^2 k_4 k_5 k_8 k_{10} k_{11} k_{14} - k_1^2 k_3^2 k_4 k_5 k_8 k_{11}^2 k_{14} - 2 k_1^2 k_3^2 k_4 k_5 k_{10} k_{11}^2 k_{14} - 2 k_1^2 \\
& k_3^2 k_4 k_5 k_{10} k_{11} k_{12} k_{14} - k_1^2 k_3^2 k_4 k_6^2 k_8 k_{10} k_{11} - k_1^2 k_3^2 k_4 k_6^2 k_8 k_{11}^2 - 2 k_1^2 k_3^2 k_4 k_6^2 k_{10} k_{11}^2 \\
& - 2 k_1^2 k_3^2 k_4 k_6^2 k_{10} k_{11} k_{12} - k_1^2 k_3^2 k_4 k_6 k_8 k_{10} k_{11}^2 - 3 k_1^2 k_3^2 k_4 k_6 k_8 k_{10} k_{11} k_{14} - 2 k_1^2 \\
& k_3^2 k_4 k_6 k_8 k_{11}^2 k_{14} - 4 k_1^2 k_3^2 k_4 k_6 k_{10} k_{11}^2 k_{14} - 4 k_1^2 k_3^2 k_4 k_6 k_{10} k_{11} k_{12} k_{14} - k_1^2 k_3^2 k_4 k_8 k_{10} \\
& k_{11}^2 k_{14} - 2 k_1^2 k_3^2 k_4 k_8 k_{10} k_{11} k_{14}^2 - k_1^2 k_3^2 k_4 k_8 k_{11}^2 k_{14}^2 - 2 k_1^2 k_3^2 k_4 k_{10} k_{11}^2 k_{14}^2 - 2 k_1^2 \\
& k_3^2 k_4 k_{10} k_{11} k_{12} k_{14}^2 - k_1^2 k_3 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} - k_1^2 k_3 k_4 k_5 k_6 k_7 k_8 k_{10} k_{13} - 2
\end{aligned}$$

$$\begin{aligned}
& k_1^2 k_3 k_4 k_5 k_6 k_7 k_8 k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} - 2 k_1^2 k_3 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{13} \\
& - k_1^2 k_3 k_4 k_5 k_6 k_7 k_{10} k_{12} k_{13} - k_1^2 k_3 k_4 k_5 k_6 k_7 k_{11} k_{12} k_{13} - k_1^2 k_3 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 - \\
& k_1^2 k_3 k_4 k_5 k_6 k_8 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_6 k_8 k_{11}^2 k_{13} - 2 k_1^2 k_3 k_4 k_5 k_6 k_{10} k_{11}^2 k_{13} - 2 \\
& k_1^2 k_3 k_4 k_5 k_6 k_{10} k_{11} k_{12} k_{13} - k_1^2 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{14} \\
& - k_1^2 k_3 k_4 k_5 k_7 k_8 k_{11} k_{13} k_{14} - k_1^2 k_3 k_4 k_5 k_7 k_{10} k_{11} k_{12} k_{13} - 2 \\
& k_1^2 k_3 k_4 k_5 k_7 k_{10} k_{11} k_{12} k_{14} - k_1^2 k_3 k_4 k_5 k_7 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_3 k_4 k_5 k_8 k_{10} k_{11}^2 k_{13} - 2 \\
& k_1^2 k_3 k_4 k_5 k_8 k_{10} k_{11}^2 k_{14} - k_1^2 k_3 k_4 k_5 k_8 k_{11}^2 k_{13} k_{14} - k_1^2 k_3 k_4 k_6^2 k_7 k_8 k_{10} k_{11} - k_1^2 k_3 k_4 \\
& k_6^2 k_7 k_8 k_{10} k_{13} - 2 k_1^2 k_3 k_4 k_6^2 k_7 k_8 k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_6^2 k_7 k_{10} k_{11} k_{12} - 4 k_1^2 k_3 k_4 \\
& k_6^2 k_7 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_6^2 k_7 k_{10} k_{12} k_{13} - k_1^2 k_3 k_4 k_6^2 k_8 k_{10} k_{11}^2 - k_1^2 k_3 k_4 \\
& k_6^2 k_8 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_6^2 k_8 k_{11}^2 k_{13} - 4 k_1^2 k_3 k_4 k_6^2 k_{10} k_{11}^2 k_{13} - 4 k_1^2 k_3 k_4 \\
& k_6^2 k_{10} k_{11} k_{12} k_{13} - 3 k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{13} - 3 k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{14} - 2 \\
& k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{13} k_{14} - 2 k_1^2 k_3 k_4 k_6 k_7 k_8 k_{11} k_{13} k_{14} - 2 k_1^2 k_3 k_4 k_6 k_7 k_{10} k_{11} k_{12} k_{13} \\
& - 4 k_1^2 k_3 k_4 k_6 k_7 k_{10} k_{11} k_{12} k_{14} - 4 k_1^2 k_3 k_4 k_6 k_7 k_{10} k_{11} k_{13} k_{14} - 2 \\
& k_1^2 k_3 k_4 k_6 k_7 k_{10} k_{12} k_{13} k_{14} - 3 k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11}^2 k_{13} - 3 k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11}^2 k_{14} - 2 \\
& k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11} k_{13} k_{14} - 2 k_1^2 k_3 k_4 k_6 k_8 k_{11}^2 k_{13} k_{14} - 4 k_1^2 k_3 k_4 k_6 k_{10} k_{11}^2 k_{13} k_{14} \\
& - 4 k_1^2 k_3 k_4 k_6 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_1^2 k_3 k_4 k_7 k_8 k_{10} k_{11} k_{13} k_{14} - 2 \\
& k_1^2 k_3 k_4 k_7 k_8 k_{10} k_{11} k_{14}^2 - 2 k_1^2 k_3 k_4 k_7 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_1^2 k_3 k_4 k_7 k_{10} k_{11} k_{12} k_{14}^2 \\
& - 2 k_1^2 k_3 k_4 k_8 k_{10} k_{11}^2 k_{13} k_{14} - 2 k_1^2 k_3 k_4 k_8 k_{10} k_{11}^2 k_{14}^2 - k_1^2 k_4 k_5 k_6 k_7^2 k_8 k_{10} k_{13} - \\
& k_1^2 k_4 k_5 k_6 k_7^2 k_8 k_{13}^2 - k_1^2 k_4 k_5 k_6 k_7^2 k_{10} k_{12} k_{13} - k_1^2 k_4 k_5 k_6 k_7^2 k_{12} k_{13}^2 - 2 \\
& k_1^2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13} - 2 k_1^2 k_4 k_5 k_6 k_7 k_8 k_{11} k_{13}^2 - k_1^2 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13} - \\
& k_1^2 k_4 k_5 k_6 k_7 k_{11} k_{12} k_{13}^2 - k_1^2 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 k_{13} - k_1^2 k_4 k_5 k_6 k_8 k_{11}^2 k_{13}^2 - k_1^2 k_4 k_6^2 \\
& k_7 k_8 k_{10} k_{13} - k_1^2 k_4 k_6^2 k_7^2 k_8 k_{13}^2 - 2 k_1^2 k_4 k_6^2 k_7^2 k_{10} k_{12} k_{13} - 2 k_1^2 k_4 k_6^2 k_7^2 k_{10} k_{13}^2 - 2 k_1^2 k_4 \\
& k_6^2 k_7 k_8 k_{10} k_{11} k_{13} - 2 k_1^2 k_4 k_6^2 k_7 k_8 k_{11} k_{13}^2 - 2 k_1^2 k_4 k_6^2 k_7 k_{10} k_{11} k_{12} k_{13} - 4 k_1^2 k_4 \\
& k_6^2 k_7 k_{10} k_{11} k_{13}^2 - 2 k_1^2 k_4 k_6^2 k_7 k_{10} k_{12} k_{13}^2 - k_1^2 k_4 k_6^2 k_8 k_{10} k_{11}^2 k_{13} - k_1^2 k_4 k_6^2 k_8 k_{11}^2 k_{13}^2 \\
& - 2 k_1^2 k_4 k_6^2 k_{10} k_{11}^2 k_{13}^2 - 2 k_1^2 k_4 k_6^2 k_{10} k_{11} k_{12} k_{13}^2 - 2 k_1^2 k_4 k_6 k_7^2 k_8 k_{10} k_{13}^2 - 2 k_1^2 k_4 k_6 \\
& k_7^2 k_8 k_{10} k_{13} k_{14} - 2 k_1^2 k_4 k_6 k_7^2 k_{10} k_{12} k_{13}^2 - 2 k_1^2 k_4 k_6 k_7^2 k_{10} k_{12} k_{13} k_{14} - 4 \\
& k_1^2 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{13}^2 - 4 k_1^2 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{13} k_{14} - 2 k_1^2 k_4 k_6 k_7 k_{10} k_{11} k_{12} k_{13}^2
\end{aligned}$$

$$\begin{aligned}
& -2k_1^2 k_4 k_6 k_7 k_{10} k_{11} k_{12} k_{13} k_{14} - 2k_1^2 k_4 k_6 k_8 k_{10} k_{11}^2 k_{13}^2 - 2k_1^2 k_4 k_6 k_8 k_{10} k_{11}^2 k_{13} k_{14} \\
& - 2k_1 k_2 k_3 k_4^2 k_6^2 k_7 k_9 k_{11} - k_1 k_2 k_3 k_4^2 k_6^2 k_7 k_9 k_{12} - k_1 k_2 k_3 k_4^2 k_6^2 k_7 k_{11} k_{12} - 2k_1 k_2 k_3 \\
& k_4^2 k_6^2 k_9 k_{11}^2 - 2k_1 k_2 k_3 k_4^2 k_6^2 k_9 k_{11} k_{12} - 2k_1 k_2 k_3 k_4^2 k_6 k_7 k_8 k_9 k_{11} - k_1 k_2 k_3 \\
& k_4^2 k_6 k_7 k_8 k_9 k_{14} - k_1 k_2 k_3 k_4^2 k_6 k_7 k_8 k_{11} k_{14} - k_1 k_2 k_3 k_4^2 k_6 k_7 k_9 k_{11} k_{12} - 2k_1 k_2 k_3 \\
& k_4^2 k_6 k_7 k_9 k_{11} k_{14} - k_1 k_2 k_3 k_4^2 k_6 k_7 k_9 k_{12} k_{14} - 2k_1 k_2 k_3 k_4^2 k_6 k_7 k_{11} k_{12} k_{14} - 2k_1 k_2 k_3 \\
& k_4^2 k_6 k_8 k_9 k_{11}^2 - k_1 k_2 k_3 k_4^2 k_6 k_8 k_9 k_{11} k_{14} - k_1 k_2 k_3 k_4^2 k_6 k_8 k_{11}^2 k_{14} - 2k_1 k_2 k_3 k_4^2 k_6 k_9 \\
& k_{11}^2 k_{14} - 2k_1 k_2 k_3 k_4^2 k_6 k_9 k_{11} k_{12} k_{14} - k_1 k_2 k_3 k_4^2 k_7 k_8 k_9 k_{11} k_{14} - k_1 k_2 k_3 k_4^2 k_7 k_8 k_{11} \\
& k_{14}^2 - k_1 k_2 k_3 k_4^2 k_7 k_9 k_{11} k_{12} k_{14} - k_1 k_2 k_3 k_4^2 k_7 k_{11} k_{12} k_{14}^2 - k_1 k_2 k_3 k_4^2 k_8 k_9 k_{11}^2 k_{14} \\
& - k_1 k_2 k_3 k_4^2 k_8 k_{11}^2 k_{14}^2 - k_1 k_2 k_4^2 k_6^2 k_7^2 k_9 k_{12} - 2k_1 k_2 k_4^2 k_6^2 k_7^2 k_9 k_{13} - k_1 k_2 k_4^2 k_6^2 \\
& k_7^2 k_{12} k_{13} - k_1 k_2 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} - 4k_1 k_2 k_4^2 k_6^2 k_7 k_9 k_{11} k_{13} - 2k_1 k_2 k_4^2 k_6^2 k_7 k_9 k_{12} k_{13} \\
& - k_1 k_2 k_4^2 k_6^2 k_7 k_{11} k_{12} k_{13} - 2k_1 k_2 k_4^2 k_6^2 k_9 k_{11}^2 k_{13} - 2k_1 k_2 k_4^2 k_6^2 k_9 k_{11} k_{12} k_{13} \\
& - 2k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_9 k_{13} - k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_9 k_{14} - k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_{13} k_{14} - 2k_1 k_2 \\
& k_4^2 k_6 k_7^2 k_9 k_{12} k_{13} - k_1 k_2 k_4^2 k_6 k_7^2 k_9 k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7^2 k_{12} k_{13} k_{14} - 4k_1 k_2 \\
& k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{13} - 2k_1 k_2 k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{14} - 2k_1 k_2 k_4^2 k_6 k_7 k_8 k_{11} k_{13} k_{14} \\
& - 2k_1 k_2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{13} - k_1 k_2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{14} - k_1 k_2 \\
& k_4^2 k_6 k_7 k_{11} k_{12} k_{13} k_{14} - 2k_1 k_2 k_4^2 k_6 k_8 k_9 k_{11}^2 k_{13} - k_1 k_2 k_4^2 k_6 k_8 k_9 k_{11}^2 k_{14} - k_1 k_2 \\
& k_4^2 k_6 k_8 k_{11}^2 k_{13} k_{14} - 2k_1 k_3^2 k_4^2 k_6^2 k_7 k_9 k_{11} - k_1 k_3^2 k_4^2 k_6^2 k_7 k_9 k_{12} - k_1 k_3^2 k_4^2 k_6^2 k_7 k_{11} k_{12} \\
& - 2k_1 k_3^2 k_4^2 k_6^2 k_9 k_{11}^2 - 2k_1 k_3^2 k_4^2 k_6^2 k_9 k_{11} k_{12} - 2k_1 k_3^2 k_4^2 k_6 k_7 k_8 k_9 k_{11} - k_1 k_3^2 \\
& k_4^2 k_6 k_7 k_8 k_9 k_{14} - k_1 k_3^2 k_4^2 k_6 k_7 k_8 k_{11} k_{14} - k_1 k_3^2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} - 2k_1 k_3^2 \\
& k_4^2 k_6 k_7 k_9 k_{11} k_{14} - k_1 k_3^2 k_4^2 k_6 k_7 k_9 k_{12} k_{14} - 2k_1 k_3^2 k_4^2 k_6 k_7 k_{11} k_{12} k_{14} - 2k_1 k_3^2 \\
& k_4^2 k_6 k_8 k_9 k_{11}^2 - 2k_1 k_3^2 k_4^2 k_6 k_8 k_9 k_{11} k_{14} - 4k_1 k_3^2 k_4^2 k_6 k_9 k_{11}^2 k_{14} - 4k_1 k_3^2 \\
& k_4^2 k_6 k_9 k_{11} k_{12} k_{14} - k_1 k_3^2 k_4^2 k_7 k_8 k_9 k_{11} k_{14} - k_1 k_3^2 k_4^2 k_7 k_8 k_{11} k_{14}^2 - k_1 k_3^2 \\
& k_4^2 k_7 k_9 k_{11} k_{12} k_{14} - k_1 k_3^2 k_4^2 k_7 k_{11} k_{12} k_{14}^2 - 2k_1 k_3^2 k_4^2 k_8 k_9 k_{11}^2 k_{14} - 2k_1 k_3^2 k_4^2 k_8 k_9 k_{11} \\
& k_{14}^2 - 2k_1 k_3^2 k_4^2 k_9 k_{11}^2 k_{14}^2 - 2k_1 k_3^2 k_4^2 k_9 k_{11} k_{12} k_{14}^2 - k_1 k_3^2 k_4^2 k_6^2 k_7^2 k_9 k_{12} - 2k_1 k_3^2 k_4^2 k_6^2 \\
& k_7^2 k_9 k_{13} - k_1 k_3^2 k_4^2 k_6^2 k_7^2 k_{12} k_{13} - k_1 k_3^2 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} - 6k_1 k_3^2 k_4^2 k_6^2 k_7 k_9 k_{11} k_{13} \\
& - 3k_1 k_3^2 k_4^2 k_6^2 k_7 k_9 k_{12} k_{13} - 2k_1 k_3^2 k_4^2 k_6^2 k_7 k_{11} k_{12} k_{13} - 4k_1 k_3^2 k_4^2 k_6^2 k_9 k_{11}^2 k_{13} \\
& - 4k_1 k_3^2 k_4^2 k_6^2 k_9 k_{11} k_{12} k_{13} - 2k_1 k_3^2 k_4^2 k_6 k_7^2 k_8 k_9 k_{13} - k_1 k_3^2 k_4^2 k_6 k_7^2 k_8 k_9 k_{14} - k_1 k_3^2
\end{aligned}$$

$$\begin{aligned}
& k_4^2 k_6 k_7^2 k_8 k_{13} k_{14} - 2 k_1 k_3 k_4^2 k_6 k_7^2 k_9 k_{12} k_{13} - k_1 k_3 k_4^2 k_6 k_7^2 k_9 k_{12} k_{14} - k_1 k_3 k_4^2 k_6 \\
& k_7^2 k_{12} k_{13} k_{14} - 6 k_1 k_3 k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{13} - 3 k_1 k_3 k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{14} - 2 k_1 k_3 \\
& k_4^2 k_6 k_7 k_8 k_9 k_{13} k_{14} - k_1 k_3 k_4^2 k_6 k_7 k_8 k_{11} k_{13} k_{14} - 3 k_1 k_3 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{13} \\
& - 3 k_1 k_3 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{14} - 4 k_1 k_3 k_4^2 k_6 k_7 k_9 k_{11} k_{13} k_{14} - 2 k_1 k_3 \\
& k_4^2 k_6 k_7 k_9 k_{12} k_{13} k_{14} - 2 k_1 k_3 k_4^2 k_6 k_7 k_{11} k_{12} k_{13} k_{14} - 4 k_1 k_3 k_4^2 k_6 k_8 k_9 k_{11}^2 k_{13} \\
& - 2 k_1 k_3 k_4^2 k_6 k_8 k_9 k_{11}^2 k_{14} - 2 k_1 k_3 k_4^2 k_6 k_8 k_9 k_{11} k_{13} k_{14} - 4 k_1 k_3 k_4^2 k_6 k_9 k_{11}^2 k_{13} k_{14} \\
& - 4 k_1 k_3 k_4^2 k_6 k_9 k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_3 k_4^2 k_7 k_8 k_9 k_{11} k_{13} k_{14} - 2 k_1 k_3 k_4^2 k_7 k_8 k_9 k_{11} \\
& k_{14}^2 - 2 k_1 k_3 k_4^2 k_7 k_9 k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_3 k_4^2 k_7 k_9 k_{11} k_{12} k_{14}^2 - 2 k_1 k_3 k_4^2 k_8 k_9 \\
& k_{11}^2 k_{13} k_{14} - 2 k_1 k_3 k_4^2 k_8 k_9 k_{11}^2 k_{14}^2 - k_1 k_4^2 k_6^2 k_7^2 k_9 k_{12} k_{13} - 2 k_1 k_4^2 k_6^2 k_7^2 k_9 k_{13}^2 - k_1 k_4^2 \\
& k_6^2 k_7^2 k_{12} k_{13}^2 - k_1 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} k_{13} - 4 k_1 k_4^2 k_6^2 k_7 k_9 k_{11} k_{13}^2 - 2 k_1 k_4^2 k_6^2 k_7 k_9 k_{12} k_{13}^2 \\
& - k_1 k_4^2 k_6^2 k_7 k_{11} k_{12} k_{13}^2 - 2 k_1 k_4^2 k_6^2 k_9 k_{11}^2 k_{13}^2 - 2 k_1 k_4^2 k_6^2 k_9 k_{11} k_{12} k_{13}^2 - 2 k_1 k_4^2 k_6^2 \\
& k_7^2 k_8 k_9 k_{13}^2 - 2 k_1 k_4^2 k_6^2 k_7^2 k_8 k_9 k_{13} k_{14} - 2 k_1 k_4^2 k_6^2 k_7^2 k_9 k_{12} k_{13}^2 - 2 k_1 k_4^2 k_6^2 \\
& k_7^2 k_9 k_{12} k_{13} k_{14} - 4 k_1 k_4^2 k_6^2 k_7 k_8 k_9 k_{11} k_{13}^2 - 4 k_1 k_4^2 k_6^2 k_7 k_8 k_9 k_{11} k_{13} k_{14} - 2 k_1 \\
& k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{13}^2 - 2 k_1 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_4^2 k_6 k_8 k_9 k_{11}^2 k_{13}^2 - 2 k_1 \\
& k_4^2 k_6 k_8 k_9 k_{11}^2 k_{13} k_{14} \Big) x_5^3 + \Big(-k_1^2 k_3^2 k_5^2 k_8 k_{10}^2 k_{11} - k_1^2 k_3^2 k_5^2 k_8 k_{10} k_{11}^2 - k_1^2 k_3^2 k_5^2 k_{10}^2 k_{11}^2 - \\
& k_1^2 k_3^2 k_5^2 k_{10}^2 k_{11} k_{12} - 2 k_1^2 k_3^2 k_5 k_6 k_8 k_{10}^2 k_{11} - 2 k_1^2 k_3^2 k_5 k_6 k_8 k_{10} k_{11}^2 - 2 k_1^2 k_3^2 k_5 k_6 k_{10}^2 \\
& k_{11}^2 - 2 k_1^2 k_3^2 k_5 k_6 k_{10}^2 k_{11} k_{12} - 2 k_1^2 k_3^2 k_5 k_8 k_{10}^2 k_{11} k_{14} - 2 k_1^2 k_3^2 k_5 k_8 k_{10} k_{11}^2 k_{14} - 2 k_1^2 \\
& k_3^2 k_5 k_{10}^2 k_{11}^2 k_{14} - 2 k_1^2 k_3^2 k_5 k_{10}^2 k_{11} k_{12} k_{14} - k_1^2 k_3^2 k_6^2 k_8 k_{10}^2 k_{11} - k_1^2 k_3^2 k_6^2 k_8 k_{10} k_{11}^2 - k_1^2 \\
& k_3^2 k_6^2 k_{10}^2 k_{11}^2 - k_1^2 k_3^2 k_6^2 k_{10}^2 k_{11} k_{12} - 2 k_1^2 k_3^2 k_6 k_8 k_{10}^2 k_{11} k_{14} - 2 k_1^2 k_3^2 k_6 k_8 k_{10} k_{11}^2 k_{14} \\
& - 2 k_1^2 k_3^2 k_6 k_{10}^2 k_{11}^2 k_{14} - 2 k_1^2 k_3^2 k_6 k_{10}^2 k_{11} k_{12} k_{14} - k_1^2 k_3^2 k_8 k_{10}^2 k_{11} k_{14}^2 - k_1^2 k_3^2 k_8 k_{10} k_{11}^2 \\
& k_{14}^2 - k_1^2 k_3^2 k_{10}^2 k_{11}^2 k_{14}^2 - k_1^2 k_3^2 k_{10}^2 k_{11} k_{12} k_{14}^2 - k_1^2 k_3 k_5^2 k_7 k_8 k_{10}^2 k_{11} - k_1^2 k_3 \\
& k_5^2 k_7 k_8 k_{10} k_{11} k_{13} - k_1^2 k_3 k_5^2 k_7 k_{10}^2 k_{11} k_{12} - k_1^2 k_3 k_5^2 k_7 k_{10} k_{11} k_{12} k_{13} - k_1^2 k_3 k_5^2 k_8 k_{10}^2 \\
& k_{11}^2 - k_1^2 k_3 k_5^2 k_8 k_{10} k_{11}^2 k_{13} - 2 k_1^2 k_3 k_5 k_6 k_7 k_8 k_{10}^2 k_{11} - k_1^2 k_3 k_5 k_6 k_7 k_8 k_{10}^2 k_{13} - 3 \\
& k_1^2 k_3 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_5 k_6 k_7 k_{10}^2 k_{11} k_{12} - 2 k_1^2 k_3 k_5 k_6 k_7 k_{10}^2 k_{11} k_{13} - \\
& k_1^2 k_3 k_5 k_6 k_7 k_{10}^2 k_{12} k_{13} - k_1^2 k_3 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13} - 2 k_1^2 k_3 k_5 k_6 k_8 k_{10}^2 k_{11}^2 - \\
& k_1^2 k_3 k_5 k_6 k_8 k_{10}^2 k_{11} k_{13} - 3 k_1^2 k_3 k_5 k_6 k_8 k_{10} k_{11}^2 k_{13} - 2 k_1^2 k_3 k_5 k_6 k_{10}^2 k_{11}^2 k_{13} - 2 \\
& k_1^2 k_3 k_5 k_6 k_{10}^2 k_{11} k_{12} k_{13} - k_1^2 k_3 k_5 k_7 k_8 k_{10}^2 k_{11} k_{13} - 2 k_1^2 k_3 k_5 k_7 k_8 k_{10}^2 k_{11} k_{14} -
\end{aligned}$$

$$\begin{aligned}
& k_1^2 k_3 k_5 k_7 k_8 k_{10} k_{11} k_{13} k_{14} - k_1^2 k_3 k_5 k_7 k_{10}^2 k_{11} k_{12} k_{13} - 2 k_1^2 k_3 k_5 k_7 k_{10}^2 k_{11} k_{12} k_{14} - \\
& k_1^2 k_3 k_5 k_7 k_{10} k_{11} k_{12} k_{13} k_{14} - k_1^2 k_3 k_5 k_8 k_{10}^2 k_{11}^2 k_{13} - 2 k_1^2 k_3 k_5 k_8 k_{10}^2 k_{11}^2 k_{14} - \\
& k_1^2 k_3 k_5 k_8 k_{10} k_{11}^2 k_{13} k_{14} - k_1^2 k_3 k_6^2 k_7 k_8 k_{10}^2 k_{11} - k_1^2 k_3 k_6^2 k_7 k_8 k_{10}^2 k_{13} - 2 k_1^2 k_3 \\
& k_6^2 k_7 k_8 k_{10} k_{11} k_{13} - k_1^2 k_3 k_6^2 k_7 k_{10}^2 k_{11} k_{12} - 2 k_1^2 k_3 k_6^2 k_7 k_{10}^2 k_{11} k_{13} - k_1^2 k_3 k_6^2 k_7 \\
& k_{10}^2 k_{12} k_{13} - k_1^2 k_3 k_6^2 k_8 k_{10}^2 k_{11}^2 - k_1^2 k_3 k_6^2 k_8 k_{10}^2 k_{11} k_{13} - 2 k_1^2 k_3 k_6^2 k_8 k_{10} k_{11}^2 k_{13} - 2 \\
& k_1^2 k_3 k_6^2 k_{10}^2 k_{11}^2 k_{13} - 2 k_1^2 k_3 k_6^2 k_{10}^2 k_{11} k_{12} k_{13} - k_1^2 k_3 k_6 k_7 k_8 k_{10}^2 k_{11} k_{13} - 2 k_1^2 k_3 k_6 k_7 k_8 \\
& k_{10}^2 k_{11} k_{14} - k_1^2 k_3 k_6 k_7 k_8 k_{10}^2 k_{13} k_{14} - 2 k_1^2 k_3 k_6 k_7 k_8 k_{10} k_{11} k_{13} k_{14} - k_1^2 k_3 k_6 k_7 \\
& k_{10}^2 k_{11} k_{12} k_{13} - 2 k_1^2 k_3 k_6 k_7 k_{10}^2 k_{11} k_{12} k_{14} - 2 k_1^2 k_3 k_6 k_7 k_{10}^2 k_{11} k_{13} k_{14} - k_1^2 k_3 k_6 k_7 \\
& k_{10}^2 k_{12} k_{13} k_{14} - k_1^2 k_3 k_6 k_8 k_{10}^2 k_{11}^2 k_{13} - 2 k_1^2 k_3 k_6 k_8 k_{10}^2 k_{11}^2 k_{14} - k_1^2 k_3 k_6 k_8 \\
& k_{10}^2 k_{11} k_{13} k_{14} - 2 k_1^2 k_3 k_6 k_8 k_{10} k_{11}^2 k_{13} k_{14} - 2 k_1^2 k_3 k_6 k_{10}^2 k_{11}^2 k_{13} k_{14} - 2 k_1^2 k_3 k_6 \\
& k_{10}^2 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_3 k_7 k_8 k_{10}^2 k_{11} k_{13} k_{14} - k_1^2 k_3 k_7 k_8 k_{10}^2 k_{11} k_{14}^2 - k_1^2 k_3 k_7 \\
& k_{10}^2 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_3 k_7 k_{10}^2 k_{11} k_{12} k_{14}^2 - k_1^2 k_3 k_8 k_{10}^2 k_{11}^2 k_{13} k_{14} - k_1^2 k_3 k_8 k_{10}^2 k_{11}^2 k_{14}^2 \\
& - k_1^2 k_5 k_6 k_7^2 k_8 k_{10}^2 k_{13} - k_1^2 k_5 k_6 k_7^2 k_8 k_{10} k_{13}^2 - k_1^2 k_5 k_6 k_7^2 k_{10}^2 k_{12} k_{13} - k_1^2 k_5 k_6 \\
& k_7^2 k_{10} k_{12} k_{13}^2 - 2 k_1^2 k_5 k_6 k_7 k_8 k_{10}^2 k_{11} k_{13} - 2 k_1^2 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13}^2 - k_1^2 k_5 k_6 k_7 \\
& k_{10}^2 k_{11} k_{12} k_{13} - k_1^2 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13}^2 - k_1^2 k_5 k_6 k_8 k_{10}^2 k_{11}^2 k_{13} - k_1^2 k_5 k_6 k_8 k_{10} k_{11}^2 k_{13}^2 \\
& - k_1^2 k_6^2 k_7^2 k_8 k_{10}^2 k_{13} - k_1^2 k_6^2 k_7^2 k_8 k_{10} k_{13}^2 - k_1^2 k_6^2 k_7^2 k_{10}^2 k_{12} k_{13} - k_1^2 k_6^2 k_7^2 k_{10}^2 k_{13}^2 - 2 k_1^2 \\
& k_6^2 k_7 k_8 k_{10}^2 k_{11} k_{13} - 2 k_1^2 k_6^2 k_7 k_8 k_{10} k_{11} k_{13}^2 - k_1^2 k_6^2 k_7 k_{10}^2 k_{11} k_{12} k_{13} - 2 k_1^2 k_6^2 k_7 k_{10}^2 k_{11} \\
& k_{13}^2 - k_1^2 k_6^2 k_7 k_{10}^2 k_{12} k_{13}^2 - k_1^2 k_6^2 k_8 k_{10}^2 k_{11}^2 k_{13} - k_1^2 k_6^2 k_8 k_{10} k_{11}^2 k_{13}^2 - k_1^2 k_6^2 k_{10}^2 k_{11}^2 k_{13}^2 - \\
& k_1^2 k_6^2 k_{10}^2 k_{11} k_{12} k_{13}^2 - k_1^2 k_6 k_7^2 k_8 k_{10}^2 k_{13}^2 - k_1^2 k_6 k_7^2 k_8 k_{10}^2 k_{13} k_{14} - k_1^2 k_6 k_7^2 k_{10}^2 k_{12} k_{13}^2 - \\
& k_1^2 k_6 k_7^2 k_{10}^2 k_{12} k_{13} k_{14} - 2 k_1^2 k_6 k_7 k_8 k_{10}^2 k_{11} k_{13}^2 - 2 k_1^2 k_6 k_7 k_8 k_{10}^2 k_{11} k_{13} k_{14} - k_1^2 k_6 k_7 \\
& k_{10}^2 k_{11} k_{12} k_{13}^2 - k_1^2 k_6 k_7 k_{10}^2 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_6 k_8 k_{10}^2 k_{11}^2 k_{13}^2 - k_1^2 k_6 k_8 k_{10}^2 k_{11}^2 k_{13} k_{14} \\
& - k_1 k_2 k_3 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} - 2 k_1 k_2 k_3 k_4 k_5 k_6 k_7 k_8 k_9 k_{11} \\
& - k_1 k_2 k_3 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} - 2 k_1 k_2 k_3 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} \\
& - k_1 k_2 k_3 k_4 k_5 k_6 k_7 k_9 k_{10} k_{12} - k_1 k_2 k_3 k_4 k_5 k_6 k_7 k_9 k_{11} k_{12} \\
& - 2 k_1 k_2 k_3 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} - k_1 k_2 k_3 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11} \\
& - 2 k_1 k_2 k_3 k_4 k_5 k_6 k_8 k_9 k_{11}^2 - k_1 k_2 k_3 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 - 2 k_1 k_2 k_3 k_4 k_5 k_6 k_9 k_{10} k_{11}^2 \\
& - 2 k_1 k_2 k_3 k_4 k_5 k_6 k_9 k_{10} k_{11} k_{12} - k_1 k_2 k_3 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11}
\end{aligned}$$

$$\begin{aligned}
& -k_1 k_2 k_3 k_4 k_5 k_7 k_8 k_9 k_{11} k_{14} - 2 k_1 k_2 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{14} \\
& -k_1 k_2 k_3 k_4 k_5 k_7 k_9 k_{10} k_{11} k_{12} - k_1 k_2 k_3 k_4 k_5 k_7 k_9 k_{11} k_{12} k_{14} \\
& -2 k_1 k_2 k_3 k_4 k_5 k_7 k_{10} k_{11} k_{12} k_{14} - k_1 k_2 k_3 k_4 k_5 k_8 k_9 k_{10} k_{11}^2 - k_1 k_2 k_3 k_4 k_5 k_8 k_9 \\
& k_{11}^2 k_{14} - 2 k_1 k_2 k_3 k_4 k_5 k_8 k_{10} k_{11}^2 k_{14} - k_1 k_2 k_3 k_4 k_6^2 k_7 k_8 k_9 k_{10} - 2 k_1 k_2 k_3 k_4 \\
& k_6^2 k_7 k_8 k_9 k_{11} - k_1 k_2 k_3 k_4 k_6^2 k_7 k_8 k_{10} k_{11} - 2 k_1 k_2 k_3 k_4 k_6^2 k_7 k_9 k_{10} k_{11} - k_1 k_2 k_3 k_4 \\
& k_6^2 k_7 k_9 k_{10} k_{12} - k_1 k_2 k_3 k_4 k_6^2 k_7 k_9 k_{11} k_{12} - 2 k_1 k_2 k_3 k_4 k_6^2 k_7 k_{10} k_{11} k_{12} - k_1 k_2 k_3 k_4 \\
& k_6^2 k_8 k_9 k_{10} k_{11} - 2 k_1 k_2 k_3 k_4 k_6^2 k_8 k_9 k_{11}^2 - k_1 k_2 k_3 k_4 k_6^2 k_8 k_{10} k_{11}^2 - 2 k_1 k_2 k_3 k_4 \\
& k_6^2 k_9 k_{10} k_{11}^2 - 2 k_1 k_2 k_3 k_4 k_6^2 k_9 k_{10} k_{11} k_{12} - k_1 k_2 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} \\
& -k_1 k_2 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{14} - 3 k_1 k_2 k_3 k_4 k_6 k_7 k_8 k_9 k_{11} k_{14} \\
& -3 k_1 k_2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{14} - k_1 k_2 k_3 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} \\
& -2 k_1 k_2 k_3 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{14} - k_1 k_2 k_3 k_4 k_6 k_7 k_9 k_{10} k_{12} k_{14} \\
& -2 k_1 k_2 k_3 k_4 k_6 k_7 k_9 k_{11} k_{12} k_{14} - 4 k_1 k_2 k_3 k_4 k_6 k_7 k_{10} k_{11} k_{12} k_{14} \\
& -k_1 k_2 k_3 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 - k_1 k_2 k_3 k_4 k_6 k_8 k_9 k_{10} k_{11} k_{14} - 3 k_1 k_2 k_3 k_4 k_6 k_8 k_9 \\
& k_{11}^2 k_{14} - 3 k_1 k_2 k_3 k_4 k_6 k_8 k_{10} k_{11}^2 k_{14} - 2 k_1 k_2 k_3 k_4 k_6 k_9 k_{10} k_{11}^2 k_{14} \\
& -2 k_1 k_2 k_3 k_4 k_6 k_9 k_{10} k_{11} k_{12} k_{14} - k_1 k_2 k_3 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{14} \\
& -k_1 k_2 k_3 k_4 k_7 k_8 k_9 k_{11} k_{14}^2 - 2 k_1 k_2 k_3 k_4 k_7 k_8 k_{10} k_{11} k_{14}^2 \\
& -k_1 k_2 k_3 k_4 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - k_1 k_2 k_3 k_4 k_7 k_9 k_{11} k_{12} k_{14}^2 \\
& -2 k_1 k_2 k_3 k_4 k_7 k_{10} k_{11} k_{12} k_{14}^2 - k_1 k_2 k_3 k_4 k_8 k_9 k_{10} k_{11}^2 k_{14} - k_1 k_2 k_3 k_4 k_8 k_9 k_{11}^2 k_{14}^2 \\
& -2 k_1 k_2 k_3 k_4 k_8 k_{10} k_{11}^2 k_{14}^2 - k_1 k_2 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{10} - 2 k_1 k_2 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{13} \\
& -k_1 k_2 k_4 k_5 k_6 k_7^2 k_8 k_{10} k_{13} - k_1 k_2 k_4 k_5 k_6 k_7^2 k_9 k_{10} k_{12} - 2 k_1 k_2 k_4 k_5 k_6 k_7^2 k_9 k_{12} k_{13} \\
& -k_1 k_2 k_4 k_5 k_6 k_7^2 k_{10} k_{12} k_{13} - 2 k_1 k_2 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} \\
& -4 k_1 k_2 k_4 k_5 k_6 k_7 k_8 k_9 k_{11} k_{13} - 2 k_1 k_2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13} \\
& -k_1 k_2 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} - 2 k_1 k_2 k_4 k_5 k_6 k_7 k_9 k_{11} k_{12} k_{13} \\
& -k_1 k_2 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13} - k_1 k_2 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 - 2 k_1 k_2 k_4 k_5 k_6 k_8 k_9 \\
& k_{11}^2 k_{13} - k_1 k_2 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 k_{13} - k_1 k_2 k_4 k_6^2 k_7^2 k_8 k_9 k_{10} - 2 k_1 k_2 k_4 k_6^2 k_7^2 k_8 k_9 k_{13} \\
& -k_1 k_2 k_4 k_6^2 k_7^2 k_8 k_{10} k_{13} - k_1 k_2 k_4 k_6^2 k_7^2 k_9 k_{10} k_{12} - 2 k_1 k_2 k_4 k_6^2 k_7^2 k_9 k_{10} k_{13} - k_1 k_2 k_4 \\
& k_6^2 k_7^2 k_9 k_{12} k_{13} - 2 k_1 k_2 k_4 k_6^2 k_7^2 k_{10} k_{12} k_{13} - 2 k_1 k_2 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{11} - 4 k_1 k_2 k_4
\end{aligned}$$

$$\begin{aligned}
& k_6^2 k_7 k_8 k_9 k_{11} k_{13} - 2 k_1 k_2 k_4 k_6^2 k_7 k_8 k_{10} k_{11} k_{13} - k_1 k_2 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} \\
& - 4 k_1 k_2 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{13} - 2 k_1 k_2 k_4 k_6^2 k_7 k_9 k_{10} k_{12} k_{13} - k_1 k_2 k_4 \\
& k_6^2 k_7 k_9 k_{11} k_{12} k_{13} - 2 k_1 k_2 k_4 k_6^2 k_7 k_{10} k_{11} k_{12} k_{13} - k_1 k_2 k_4 k_6^2 k_8 k_9 k_{10} k_{11}^2 - 2 k_1 k_2 k_4 \\
& k_6^2 k_8 k_9 k_{11}^2 k_{13} - k_1 k_2 k_4 k_6^2 k_8 k_{10} k_{11}^2 k_{13} - 2 k_1 k_2 k_4 k_6^2 k_9 k_{10} k_{11}^2 k_{13} - 2 k_1 k_2 k_4 \\
& k_6^2 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_1 k_2 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{13} - k_1 k_2 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{14} \\
& - k_1 k_2 k_4 k_6 k_7^2 k_8 k_9 k_{13} k_{14} - 2 k_1 k_2 k_4 k_6 k_7^2 k_8 k_{10} k_{13} k_{14} - 2 k_1 k_2 k_4 k_6 \\
& k_7^2 k_9 k_{10} k_{12} k_{13} - k_1 k_2 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{14} - k_1 k_2 k_4 k_6 k_7^2 k_9 k_{12} k_{13} k_{14} - 2 k_1 k_2 k_4 k_6 \\
& k_7^2 k_{10} k_{12} k_{13} k_{14} - 4 k_1 k_2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 2 k_1 k_2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{14} \\
& - 2 k_1 k_2 k_4 k_6 k_7 k_8 k_9 k_{11} k_{13} k_{14} - 4 k_1 k_2 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{13} k_{14} \\
& - 2 k_1 k_2 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - k_1 k_2 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{14} \\
& - k_1 k_2 k_4 k_6 k_7 k_9 k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_2 k_4 k_6 k_7 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - 2 k_1 k_2 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13} - k_1 k_2 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 k_{14} - k_1 k_2 k_4 k_6 k_8 k_9 k_{11}^2 k_{13} k_{14} \\
& - 2 k_1 k_2 k_4 k_6 k_8 k_{10} k_{11}^2 k_{13} k_{14} - k_1 k_3^2 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} - 2 k_1 k_3^2 k_4 k_5 k_6 k_7 k_8 k_9 k_{11} \\
& - k_1 k_3^2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} - 2 k_1 k_3^2 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} - k_1 k_3^2 k_4 k_5 k_6 k_7 k_9 k_{10} k_{12} \\
& - k_1 k_3^2 k_4 k_5 k_6 k_7 k_9 k_{11} k_{12} - 2 k_1 k_3^2 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} - k_1 k_3^2 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11} \\
& - 2 k_1 k_3^2 k_4 k_5 k_6 k_8 k_9 k_{11}^2 - k_1 k_3^2 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 - 2 k_1 k_3^2 k_4 k_5 k_6 k_9 k_{10} k_{11}^2 - 2 k_1 \\
& k_3^2 k_4 k_5 k_6 k_9 k_{10} k_{11} k_{12} - k_1 k_3^2 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} - k_1 k_3^2 k_4 k_5 k_7 k_8 k_9 k_{11} k_{14} - 2 k_1 \\
& k_3^2 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{14} - k_1 k_3^2 k_4 k_5 k_7 k_9 k_{10} k_{11} k_{12} - k_1 k_3^2 k_4 k_5 k_7 k_9 k_{11} k_{12} k_{14} - 2 k_1 \\
& k_3^2 k_4 k_5 k_7 k_{10} k_{11} k_{12} k_{14} - k_1 k_3^2 k_4 k_5 k_8 k_9 k_{10} k_{11}^2 - 2 k_1 k_3^2 k_4 k_5 k_8 k_9 k_{10} k_{11} k_{14} - 2 k_1 \\
& k_3^2 k_4 k_5 k_8 k_9 k_{11}^2 k_{14} - k_1 k_3^2 k_4 k_5 k_8 k_{10} k_{11}^2 k_{14} - 2 k_1 k_3^2 k_4 k_5 k_9 k_{10} k_{11}^2 k_{14} - 2 k_1 \\
& k_3^2 k_4 k_5 k_9 k_{10} k_{11} k_{12} k_{14} - k_1 k_3^2 k_4 k_6^2 k_7 k_8 k_9 k_{10} - 2 k_1 k_3^2 k_4 k_6^2 k_7 k_8 k_9 k_{11} - k_1 k_3^2 k_4 \\
& k_6^2 k_7 k_8 k_{10} k_{11} - 2 k_1 k_3^2 k_4 k_6^2 k_7 k_9 k_{10} k_{11} - k_1 k_3^2 k_4 k_6^2 k_7 k_9 k_{10} k_{12} - k_1 k_3^2 k_4 \\
& k_6^2 k_7 k_9 k_{11} k_{12} - 2 k_1 k_3^2 k_4 k_6^2 k_7 k_{10} k_{11} k_{12} - k_1 k_3^2 k_4 k_6^2 k_8 k_9 k_{10} k_{11} - 2 k_1 k_3^2 k_4 k_6^2 k_8 k_9 \\
& k_{11}^2 - k_1 k_3^2 k_4 k_6^2 k_8 k_{10} k_{11}^2 - 2 k_1 k_3^2 k_4 k_6^2 k_9 k_{10} k_{11}^2 - 2 k_1 k_3^2 k_4 k_6^2 k_9 k_{10} k_{11} k_{12} - k_1 \\
& k_3^2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} - k_1 k_3^2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{14} - 3 k_1 k_3^2 k_4 k_6 k_7 k_8 k_9 k_{11} k_{14} - 3 k_1 \\
& k_3^2 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{14} - k_1 k_3^2 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} - 2 k_1 k_3^2 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{14} - k_1 \\
& k_3^2 k_4 k_6 k_7 k_9 k_{10} k_{12} k_{14} - 2 k_1 k_3^2 k_4 k_6 k_7 k_9 k_{11} k_{12} k_{14} - 4 k_1 k_3^2 k_4 k_6 k_7 k_{10} k_{11} k_{12} k_{14}
\end{aligned}$$

$$\begin{aligned}
& -k_1 k_3^2 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 - 3k_1 k_3^2 k_4 k_6 k_8 k_9 k_{10} k_{11} k_{14} - 4k_1 k_3^2 k_4 k_6 k_8 k_9 k_{11}^2 k_{14} \\
& - 2k_1 k_3^2 k_4 k_6 k_8 k_{10} k_{11}^2 k_{14} - 4k_1 k_3^2 k_4 k_6 k_9 k_{10} k_{11}^2 k_{14} - 4k_1 k_3^2 k_4 k_6 k_9 k_{10} k_{11} k_{12} k_{14} \\
& - k_1 k_3^2 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{14} - k_1 k_3^2 k_4 k_7 k_8 k_9 k_{11} k_{14}^2 - 2k_1 k_3^2 k_4 k_7 k_8 k_{10} k_{11} k_{14}^2 - k_1 \\
& k_3^2 k_4 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - k_1 k_3^2 k_4 k_7 k_9 k_{11} k_{12} k_{14}^2 - 2k_1 k_3^2 k_4 k_7 k_{10} k_{11} k_{12} k_{14}^2 - k_1 \\
& k_3^2 k_4 k_8 k_9 k_{10} k_{11}^2 k_{14} - 2k_1 k_3^2 k_4 k_8 k_9 k_{10} k_{11} k_{14}^2 - 2k_1 k_3^2 k_4 k_8 k_9 k_{11}^2 k_{14}^2 - k_1 \\
& k_3^2 k_4 k_8 k_{10} k_{11}^2 k_{14}^2 - 2k_1 k_3^2 k_4 k_9 k_{10} k_{11}^2 k_{14}^2 - 2k_1 k_3^2 k_4 k_9 k_{10} k_{11} k_{12} k_{14}^2 - k_1 k_3 k_4 k_5 k_6 \\
& k_7^2 k_8 k_9 k_{10} - 2k_1 k_3 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{13} - k_1 k_3 k_4 k_5 k_6 k_7^2 k_8 k_{10} k_{13} - k_1 k_3 k_4 k_5 k_6 \\
& k_7^2 k_9 k_{10} k_{12} - 2k_1 k_3 k_4 k_5 k_6 k_7^2 k_9 k_{12} k_{13} - k_1 k_3 k_4 k_5 k_6 k_7^2 k_{10} k_{12} k_{13} \\
& - 2k_1 k_3 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} - k_1 k_3 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{13} \\
& - 6k_1 k_3 k_4 k_5 k_6 k_7 k_8 k_9 k_{11} k_{13} - 3k_1 k_3 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13} \\
& - k_1 k_3 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} - 2k_1 k_3 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{13} \\
& - k_1 k_3 k_4 k_5 k_6 k_7 k_9 k_{10} k_{12} k_{13} - 3k_1 k_3 k_4 k_5 k_6 k_7 k_9 k_{11} k_{12} k_{13} \\
& - 3k_1 k_3 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13} - k_1 k_3 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 \\
& - k_1 k_3 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11} k_{13} - 4k_1 k_3 k_4 k_5 k_6 k_8 k_9 k_{11}^2 k_{13} - 2k_1 k_3 k_4 k_5 k_6 k_8 k_{10} \\
& k_{11}^2 k_{13} - 2k_1 k_3 k_4 k_5 k_6 k_9 k_{10} k_{11}^2 k_{13} - 2k_1 k_3 k_4 k_5 k_6 k_9 k_{10} k_{11} k_{12} k_{13} \\
& - k_1 k_3 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 2k_1 k_3 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{14} \\
& - 2k_1 k_3 k_4 k_5 k_7 k_8 k_9 k_{11} k_{13} k_{14} - k_1 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{13} k_{14} \\
& - k_1 k_3 k_4 k_5 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - 2k_1 k_3 k_4 k_5 k_7 k_9 k_{10} k_{11} k_{12} k_{14} \\
& - 2k_1 k_3 k_4 k_5 k_7 k_9 k_{11} k_{12} k_{13} k_{14} - k_1 k_3 k_4 k_5 k_7 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& - k_1 k_3 k_4 k_5 k_8 k_9 k_{10} k_{11}^2 k_{13} - 2k_1 k_3 k_4 k_5 k_8 k_9 k_{10} k_{11}^2 k_{14} - 2k_1 k_3 k_4 k_5 k_8 k_9 \\
& k_{11}^2 k_{13} k_{14} - k_1 k_3 k_4 k_5 k_8 k_{10} k_{11}^2 k_{13} k_{14} - k_1 k_3 k_4 k_6^2 k_7^2 k_8 k_9 k_{10} - 2k_1 k_3 k_4 k_6^2 \\
& k_7^2 k_8 k_9 k_{13} - k_1 k_3 k_4 k_6^2 k_7^2 k_8 k_{10} k_{13} - k_1 k_3 k_4 k_6^2 k_7^2 k_9 k_{10} k_{12} - 2k_1 k_3 k_4 k_6^2 k_7^2 k_9 k_{10} k_{13} \\
& - k_1 k_3 k_4 k_6^2 k_7^2 k_9 k_{12} k_{13} - 2k_1 k_3 k_4 k_6^2 k_7^2 k_{10} k_{12} k_{13} - 2k_1 k_3 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{11} \\
& - k_1 k_3 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{13} - 6k_1 k_3 k_4 k_6^2 k_7 k_8 k_9 k_{11} k_{13} - 3k_1 k_3 k_4 k_6^2 k_7 k_8 k_{10} k_{11} k_{13} \\
& - k_1 k_3 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} - 6k_1 k_3 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{13} - 3k_1 k_3 k_4 \\
& k_6^2 k_7 k_9 k_{10} k_{12} k_{13} - 2k_1 k_3 k_4 k_6^2 k_7 k_9 k_{11} k_{12} k_{13} - 4k_1 k_3 k_4 k_6^2 k_7 k_{10} k_{11} k_{12} k_{13} \\
& - k_1 k_3 k_4 k_6^2 k_8 k_9 k_{10} k_{11}^2 - k_1 k_3 k_4 k_6^2 k_8 k_9 k_{10} k_{11} k_{13} - 4k_1 k_3 k_4 k_6^2 k_8 k_9 k_{11}^2 k_{13}
\end{aligned}$$

$$\begin{aligned}
& -2 k_1 k_3 k_4 k_6^2 k_8 k_{10} k_{11}^2 k_{13} - 4 k_1 k_3 k_4 k_6^2 k_9 k_{10} k_{11}^2 k_{13} - 4 k_1 k_3 k_4 k_6^2 k_9 k_{10} k_{11} k_{12} k_{13} \\
& -2 k_1 k_3 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{13} - k_1 k_3 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{14} - k_1 k_3 k_4 k_6 k_7^2 k_8 k_9 k_{13} k_{14} \\
& -2 k_1 k_3 k_4 k_6 k_7^2 k_8 k_{10} k_{13} k_{14} - 2 k_1 k_3 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} - k_1 k_3 k_4 k_6 \\
& k_7^2 k_9 k_{10} k_{12} k_{14} - k_1 k_3 k_4 k_6 k_7^2 k_9 k_{12} k_{13} k_{14} - 2 k_1 k_3 k_4 k_6 k_7^2 k_{10} k_{12} k_{13} k_{14} \\
& -5 k_1 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 4 k_1 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{14} \\
& -2 k_1 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{13} k_{14} - 5 k_1 k_3 k_4 k_6 k_7 k_8 k_9 k_{11} k_{13} k_{14} \\
& -4 k_1 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{13} k_{14} - 3 k_1 k_3 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} \\
& -3 k_1 k_3 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - 4 k_1 k_3 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{13} k_{14} \\
& -2 k_1 k_3 k_4 k_6 k_7 k_9 k_{10} k_{12} k_{13} k_{14} - 2 k_1 k_3 k_4 k_6 k_7 k_9 k_{11} k_{12} k_{13} k_{14} \\
& -4 k_1 k_3 k_4 k_6 k_7 k_{10} k_{11} k_{12} k_{13} k_{14} - 3 k_1 k_3 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13} \\
& -3 k_1 k_3 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 k_{14} - 2 k_1 k_3 k_4 k_6 k_8 k_9 k_{10} k_{11} k_{13} k_{14} - 4 k_1 k_3 k_4 k_6 k_8 k_9 \\
& k_{11}^2 k_{13} k_{14} - 2 k_1 k_3 k_4 k_6 k_8 k_{10} k_{11}^2 k_{13} k_{14} - 4 k_1 k_3 k_4 k_6 k_9 k_{10} k_{11}^2 k_{13} k_{14} \\
& -4 k_1 k_3 k_4 k_6 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_3 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{13} k_{14} \\
& -2 k_1 k_3 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{14}^2 - 2 k_1 k_3 k_4 k_7 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} \\
& -2 k_1 k_3 k_4 k_7 k_9 k_{10} k_{11} k_{12} k_{14}^2 - 2 k_1 k_3 k_4 k_8 k_9 k_{10} k_{11}^2 k_{13} k_{14} - 2 k_1 k_3 k_4 k_8 k_9 k_{10} k_{11}^2 \\
& k_{14}^2 - k_1 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{13} - 2 k_1 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{13}^2 - k_1 k_4 k_5 k_6 k_7^2 k_8 k_{10} k_{13}^2 \\
& -k_1 k_4 k_5 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} - 2 k_1 k_4 k_5 k_6 k_7^2 k_9 k_{12} k_{13}^2 - k_1 k_4 k_5 k_6 k_7^2 k_{10} k_{12} k_{13}^2 \\
& -2 k_1 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 4 k_1 k_4 k_5 k_6 k_7 k_8 k_9 k_{11} k_{13}^2 \\
& -2 k_1 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13}^2 - k_1 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} \\
& -2 k_1 k_4 k_5 k_6 k_7 k_9 k_{11} k_{12} k_{13}^2 - k_1 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13}^2 - k_1 k_4 k_5 k_6 k_8 k_9 k_{10} \\
& k_{11}^2 k_{13} - 2 k_1 k_4 k_5 k_6 k_8 k_9 k_{11}^2 k_{13}^2 - k_1 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 k_{13}^2 - k_1 k_4 k_6^2 k_7^2 k_8 k_9 k_{10} k_{13} \\
& -2 k_1 k_4 k_6^2 k_7^2 k_8 k_9 k_{13}^2 - k_1 k_4 k_6^2 k_7^2 k_8 k_{10} k_{13}^2 - k_1 k_4 k_6^2 k_7^2 k_9 k_{10} k_{12} k_{13} - 2 k_1 k_4 k_6^2 \\
& k_7^2 k_9 k_{10} k_{13}^2 - k_1 k_4 k_6^2 k_7^2 k_9 k_{12} k_{13}^2 - 2 k_1 k_4 k_6^2 k_7^2 k_{10} k_{12} k_{13}^2 - 2 k_1 k_4 \\
& k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 4 k_1 k_4 k_6^2 k_7 k_8 k_9 k_{11} k_{13}^2 - 2 k_1 k_4 k_6^2 k_7 k_8 k_{10} k_{11} k_{13}^2 - k_1 k_4 \\
& k_6^2 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - 4 k_1 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{13}^2 - 2 k_1 k_4 k_6^2 k_7 k_9 k_{10} k_{12} k_{13}^2 - k_1 k_4 \\
& k_6^2 k_7 k_9 k_{11} k_{12} k_{13}^2 - 2 k_1 k_4 k_6^2 k_7 k_{10} k_{11} k_{12} k_{13}^2 - k_1 k_4 k_6^2 k_8 k_9 k_{10} k_{11}^2 k_{13} - 2 k_1 k_4 \\
& k_6^2 k_8 k_9 k_{11}^2 k_{13}^2 - k_1 k_4 k_6^2 k_8 k_{10} k_{11}^2 k_{13}^2 - 2 k_1 k_4 k_6^2 k_9 k_{10} k_{11}^2 k_{13}^2 - 2 k_1 k_4
\end{aligned}$$

$$\begin{aligned}
& k_6^2 k_9 k_{10} k_{11} k_{12} k_{13}^2 - 2 k_1 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{13}^2 - 2 k_1 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{13} k_{14} \\
& - 2 k_1 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{13}^2 - 2 k_1 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} k_{14} - 4 k_1 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} \\
& k_{13}^2 - 4 k_1 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_1 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13}^2 \\
& - 2 k_1 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13}^2 - 2 k_1 k_4 k_6 k_8 k_9 k_{10} \\
& k_{11}^2 k_{13} k_{14} - k_2^2 k_4^2 k_6^2 k_7^2 k_9^2 - k_2^2 k_4^2 k_6^2 k_7^2 k_9 k_{12} - 2 k_2^2 k_4^2 k_6^2 k_7 k_9^2 k_{11} - k_2^2 k_4^2 k_6^2 k_7 k_9^2 k_{12} - \\
& k_2^2 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} - k_2^2 k_4^2 k_6^2 k_9^2 k_{11}^2 - k_2^2 k_4^2 k_6^2 k_9^2 k_{11} k_{12} - k_2^2 k_4^2 k_6 k_7^2 k_8 k_9^2 - k_2^2 k_4^2 k_6 \\
& k_7^2 k_8 k_9 k_{14} - k_2^2 k_4^2 k_6 k_7^2 k_9^2 k_{12} - k_2^2 k_4^2 k_6 k_7^2 k_9 k_{12} k_{14} - 2 k_2^2 k_4^2 k_6 k_7 k_8 k_9^2 k_{11} - 2 k_2^2 \\
& k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{14} - k_2^2 k_4^2 k_6 k_7 k_9^2 k_{11} k_{12} - k_2^2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{14} - k_2^2 k_4^2 k_6 k_8 k_9^2 k_{11}^2 \\
& - k_2^2 k_4^2 k_6 k_8 k_9 k_{11}^2 k_{14} - 2 k_2 k_3 k_4^2 k_6^2 k_7^2 k_9^2 - 2 k_2 k_3 k_4^2 k_6^2 k_7^2 k_9 k_{12} - 4 k_2 k_3 k_4^2 k_6^2 k_7 \\
& k_9^2 k_{11} - 2 k_2 k_3 k_4^2 k_6^2 k_7 k_9^2 k_{12} - 2 k_2 k_3 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} - 2 k_2 k_3 k_4^2 k_6^2 k_9^2 k_{11}^2 - 2 k_2 k_3 \\
& k_4^2 k_6^2 k_9^2 k_{11} k_{12} - 2 k_2 k_3 k_4^2 k_6 k_7^2 k_8 k_9^2 - 2 k_2 k_3 k_4^2 k_6 k_7^2 k_8 k_9 k_{14} - 2 k_2 k_3 k_4^2 k_6 k_7^2 k_9^2 k_{12} \\
& - 2 k_2 k_3 k_4^2 k_6 k_7^2 k_9 k_{12} k_{14} - 4 k_2 k_3 k_4^2 k_6 k_7 k_8 k_9^2 k_{11} - k_2 k_3 k_4^2 k_6 k_7 k_8 k_9^2 k_{14} - 3 k_2 k_3 \\
& k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{14} - 2 k_2 k_3 k_4^2 k_6 k_7 k_9^2 k_{11} k_{12} - 2 k_2 k_3 k_4^2 k_6 k_7 k_9^2 k_{11} k_{14} - k_2 k_3 \\
& k_4^2 k_6 k_7 k_9^2 k_{12} k_{14} - 3 k_2 k_3 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{14} - 2 k_2 k_3 k_4^2 k_6 k_8 k_9^2 k_{11}^2 - k_2 k_3 k_4^2 k_6 k_8 \\
& k_9^2 k_{11} k_{14} - k_2 k_3 k_4^2 k_6 k_8 k_9 k_{11}^2 k_{14} - 2 k_2 k_3 k_4^2 k_6 k_9^2 k_{11}^2 k_{14} - 2 k_2 k_3 k_4^2 k_6 k_9^2 k_{11} k_{12} k_{14} \\
& - k_2 k_3 k_4^2 k_7 k_8 k_9^2 k_{11} k_{14} - k_2 k_3 k_4^2 k_7 k_8 k_9 k_{11}^2 k_{14} - k_2 k_3 k_4^2 k_7 k_9^2 k_{11} k_{12} k_{14} - k_2 k_3 \\
& k_4^2 k_7 k_9 k_{11} k_{12} k_{14}^2 - k_2 k_3 k_4^2 k_8 k_9^2 k_{11}^2 k_{14} - k_2 k_3 k_4^2 k_8 k_9 k_{11}^2 k_{14}^2 - 2 k_2 k_4^2 k_6^2 k_7^2 k_9^2 k_{13} \\
& - 2 k_2 k_4^2 k_6^2 k_7^2 k_9 k_{12} k_{13} - 4 k_2 k_4^2 k_6^2 k_7 k_9^2 k_{11} k_{13} - 2 k_2 k_4^2 k_6^2 k_7 k_9^2 k_{12} k_{13} - 2 k_2 k_4^2 \\
& k_6^2 k_7 k_9 k_{11} k_{12} k_{13} - 2 k_2 k_4^2 k_6^2 k_9^2 k_{11}^2 k_{13} - 2 k_2 k_4^2 k_6^2 k_9^2 k_{11} k_{12} k_{13} - 2 k_2 k_4^2 k_6 k_7^2 k_8 \\
& k_9^2 k_{13} - k_2 k_4^2 k_6 k_7^2 k_8 k_9^2 k_{14} - k_2 k_4^2 k_6 k_7^2 k_8 k_9 k_{13} k_{14} - 2 k_2 k_4^2 k_6 k_7^2 k_9^2 k_{12} k_{13} - k_2 k_4^2 k_6 \\
& k_7^2 k_9^2 k_{12} k_{14} - k_2 k_4^2 k_6 k_7^2 k_9 k_{12} k_{13} k_{14} - 4 k_2 k_4^2 k_6 k_7 k_8 k_9^2 k_{11} k_{13} - 2 k_2 k_4^2 k_6 k_7 k_8 \\
& k_9^2 k_{11} k_{14} - 2 k_2 k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{13} k_{14} - 2 k_2 k_4^2 k_6 k_7 k_9^2 k_{11} k_{12} k_{13} - k_2 k_4^2 k_6 k_7 \\
& k_9^2 k_{11} k_{12} k_{14} - k_2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{13} k_{14} - 2 k_2 k_4^2 k_6 k_8 k_9^2 k_{11}^2 k_{13} - k_2 k_4^2 k_6 k_8 k_9^2 \\
& k_{11}^2 k_{14} - k_2 k_4^2 k_6 k_8 k_9 k_{11}^2 k_{13} k_{14} - k_3^2 k_4^2 k_6^2 k_7^2 k_9^2 - k_3^2 k_4^2 k_6^2 k_7^2 k_9 k_{12} - 2 k_3^2 k_4^2 k_6^2 k_7 k_9^2 k_{11} \\
& - k_3^2 k_4^2 k_6^2 k_7 k_9^2 k_{12} - k_3^2 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} - k_3^2 k_4^2 k_6^2 k_9^2 k_{11}^2 - k_3^2 k_4^2 k_6^2 k_9^2 k_{11} k_{12} - k_3^2 \\
& k_4^2 k_6 k_7^2 k_8 k_9^2 - k_3^2 k_4^2 k_6 k_7^2 k_8 k_9 k_{14} - k_3^2 k_4^2 k_6 k_7^2 k_9^2 k_{12} - k_3^2 k_4^2 k_6 k_7^2 k_9 k_{12} k_{14} - 2 k_3^2 \\
& k_4^2 k_6 k_7 k_8 k_9^2 k_{11} - k_3^2 k_4^2 k_6 k_7 k_8 k_9^2 k_{14} - k_3^2 k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{14} - k_3^2 k_4^2 k_6 k_7 k_9^2 k_{11} k_{12}
\end{aligned}$$

$$\begin{aligned}
& -2k_3^2 k_4^2 k_6 k_7 k_9^2 k_{11} k_{14} - k_3^2 k_4^2 k_6 k_7 k_9^2 k_{12} k_{14} - 2k_3^2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{14} - k_3^2 \\
& k_4^2 k_6 k_8 k_9^2 k_{11}^2 - k_3^2 k_4^2 k_6 k_8 k_9^2 k_{11} k_{14} - 2k_3^2 k_4^2 k_6 k_9^2 k_{11}^2 k_{14} - 2k_3^2 k_4^2 k_6 k_9^2 k_{11} k_{12} k_{14} - \\
& k_3^2 k_4^2 k_7 k_8 k_9^2 k_{11} k_{14} - k_3^2 k_4^2 k_7 k_8 k_9 k_{11} k_{14}^2 - k_3^2 k_4^2 k_7 k_9^2 k_{11} k_{12} k_{14} - k_3^2 k_4^2 k_7 k_9 k_{11} k_{12} \\
& k_{14}^2 - k_3^2 k_4^2 k_8 k_9^2 k_{11}^2 k_{14} - k_3^2 k_4^2 k_8 k_9^2 k_{11} k_{14}^2 - k_3^2 k_4^2 k_9^2 k_{11}^2 k_{14}^2 - k_3^2 k_4^2 k_9^2 k_{11} k_{12} k_{14}^2 \\
& - 2k_3 k_4^2 k_6^2 k_7^2 k_9^2 k_{13} - 2k_3 k_4^2 k_6^2 k_7^2 k_9 k_{12} k_{13} - 4k_3 k_4^2 k_6^2 k_7 k_9^2 k_{11} k_{13} - 2k_3 k_4^2 k_6^2 k_7 \\
& k_9^2 k_{12} k_{13} - 2k_3 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} k_{13} - 2k_3 k_4^2 k_6^2 k_9^2 k_{11}^2 k_{13} - 2k_3 k_4^2 k_6^2 k_9^2 k_{11} k_{12} k_{13} \\
& - 2k_3 k_4^2 k_6 k_7^2 k_8^2 k_9^2 k_{13} - k_3 k_4^2 k_6 k_7^2 k_8^2 k_9^2 k_{14} - k_3 k_4^2 k_6 k_7^2 k_8 k_9 k_{13} k_{14} - 2k_3 k_4^2 k_6 k_7^2 \\
& k_9^2 k_{12} k_{13} - k_3 k_4^2 k_6 k_7^2 k_9^2 k_{12} k_{14} - k_3 k_4^2 k_6 k_7^2 k_9 k_{12} k_{13} k_{14} - 4k_3 k_4^2 k_6 k_7 k_8 k_9^2 k_{11} k_{13} \\
& - 2k_3 k_4^2 k_6 k_7 k_8 k_9^2 k_{11} k_{14} - k_3 k_4^2 k_6 k_7 k_8 k_9^2 k_{13} k_{14} - k_3 k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{13} k_{14} \\
& - 2k_3 k_4^2 k_6 k_7 k_9^2 k_{11} k_{12} k_{13} - k_3 k_4^2 k_6 k_7 k_9^2 k_{11} k_{12} k_{14} - 2k_3 k_4^2 k_6 k_7 k_9^2 k_{11} k_{13} k_{14} - k_3 \\
& k_4^2 k_6 k_7 k_9^2 k_{12} k_{13} k_{14} - 2k_3 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{13} k_{14} - 2k_3 k_4^2 k_6 k_8 k_9^2 k_{11}^2 k_{13} - k_3 \\
& k_4^2 k_6 k_8 k_9^2 k_{11}^2 k_{14} - k_3 k_4^2 k_6 k_8 k_9^2 k_{11} k_{13} k_{14} - 2k_3 k_4^2 k_6 k_9^2 k_{11}^2 k_{13} k_{14} - 2k_3 k_4^2 k_6 \\
& k_9^2 k_{11} k_{12} k_{13} k_{14} - k_3 k_4^2 k_7 k_8 k_9^2 k_{11} k_{13} k_{14} - k_3 k_4^2 k_7 k_8 k_9^2 k_{11} k_{14}^2 - k_3 k_4^2 k_7 \\
& k_9^2 k_{11} k_{12} k_{13} k_{14} - k_3 k_4^2 k_7 k_9^2 k_{11} k_{12} k_{14}^2 - k_3 k_4^2 k_8 k_9^2 k_{11}^2 k_{13} k_{14} - k_3 k_4^2 k_8 k_9^2 k_{11} k_{14}^2 - \\
& k_4^2 k_6^2 k_7^2 k_9^2 k_{13}^2 - k_4^2 k_6^2 k_7^2 k_9 k_{12} k_{13}^2 - 2k_4^2 k_6^2 k_7 k_9^2 k_{11} k_{13}^2 - k_4^2 k_6^2 k_7 k_9^2 k_{12} k_{13}^2 - k_4^2 \\
& k_6^2 k_7 k_9 k_{11} k_{12} k_{13}^2 - k_4^2 k_6^2 k_9^2 k_{11}^2 k_{13}^2 - k_4^2 k_6^2 k_9^2 k_{11} k_{12} k_{13}^2 - k_4^2 k_6 k_7^2 k_8 k_9^2 k_{13}^2 - k_4^2 k_6 \\
& k_7^2 k_8 k_9^2 k_{13} k_{14} - k_4^2 k_6 k_7^2 k_9^2 k_{12} k_{13}^2 - k_4^2 k_6 k_7^2 k_9^2 k_{12} k_{13} k_{14} - 2k_4^2 k_6 k_7 k_8 k_9^2 k_{11} k_{13}^2 - 2 \\
& k_4^2 k_6 k_7 k_8 k_9^2 k_{11} k_{13} k_{14} - k_4^2 k_6 k_7 k_9^2 k_{11} k_{12} k_{13}^2 - k_4^2 k_6 k_7 k_9^2 k_{11} k_{12} k_{13} k_{14} - k_4^2 k_6 k_8 k_9^2 \\
& k_{11}^2 k_{13}^2 - k_4^2 k_6 k_8 k_9^2 k_{11}^2 k_{13} k_{14} \Big) x_5^2 + \Big(-k_1 k_2 k_3 k_5^2 k_7 k_8 k_9 k_{10} k_{11} - k_1 k_2 k_3 k_5^2 k_7 k_8 \\
& k_{10}^2 k_{11} - k_1 k_2 k_3 k_5^2 k_7 k_9 k_{10} k_{11} k_{12} - k_1 k_2 k_3 k_5^2 k_7 k_{10}^2 k_{11} k_{12} - k_1 k_2 k_3 k_5^2 k_8 k_9 k_{10} k_{11}^2 \\
& - k_1 k_2 k_3 k_5^2 k_8 k_{10}^2 k_{11}^2 - 2k_1 k_2 k_3 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} - 2k_1 k_2 k_3 k_5 k_6 k_7 k_8 k_{10}^2 k_{11} \\
& - 2k_1 k_2 k_3 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} - 2k_1 k_2 k_3 k_5 k_6 k_7 k_{10}^2 k_{11} k_{12} \\
& - 2k_1 k_2 k_3 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 - 2k_1 k_2 k_3 k_5 k_6 k_8 k_{10}^2 k_{11}^2 \\
& - 2k_1 k_2 k_3 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{14} - 2k_1 k_2 k_3 k_5 k_7 k_8 k_{10}^2 k_{11} k_{14} \\
& - 2k_1 k_2 k_3 k_5 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - 2k_1 k_2 k_3 k_5 k_7 k_{10}^2 k_{11} k_{12} k_{14} \\
& - 2k_1 k_2 k_3 k_5 k_8 k_9 k_{10} k_{11}^2 k_{14} - 2k_1 k_2 k_3 k_5 k_8 k_{10}^2 k_{11}^2 k_{14} - k_1 k_2 k_3 k_6^2 k_7 k_8 k_9 k_{10} k_{11} \\
& - k_1 k_2 k_3 k_6^2 k_7 k_8 k_{10}^2 k_{11} - k_1 k_2 k_3 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} - k_1 k_2 k_3 k_6^2 k_7 k_{10}^2 k_{11} k_{12}
\end{aligned}$$

$$\begin{aligned}
& -k_1 k_2 k_3 k_6^2 k_8 k_9 k_{10} k_{11}^2 - k_1 k_2 k_3 k_6^2 k_8 k_{10}^2 k_{11}^2 - 2 k_1 k_2 k_3 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{14} \\
& - 2 k_1 k_2 k_3 k_6 k_7 k_8 k_{10}^2 k_{11} k_{14} - 2 k_1 k_2 k_3 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_2 k_3 k_6 k_7 \\
& k_{10}^2 k_{11} k_{12} k_{14} - 2 k_1 k_2 k_3 k_6 k_8 k_9 k_{10} k_{11}^2 k_{14} - 2 k_1 k_2 k_3 k_6 k_8 k_{10}^2 k_{11}^2 k_{14} \\
& - k_1 k_2 k_3 k_7 k_8 k_9 k_{10} k_{11} k_{14}^2 - k_1 k_2 k_3 k_7 k_8 k_{10}^2 k_{11} k_{14}^2 - k_1 k_2 k_3 k_7 k_9 k_{10} k_{11} k_{12} k_{14}^2 \\
& - k_1 k_2 k_3 k_7 k_{10}^2 k_{11} k_{12} k_{14}^2 - k_1 k_2 k_3 k_8 k_9 k_{10} k_{11}^2 k_{14}^2 - k_1 k_2 k_3 k_8 k_{10}^2 k_{11}^2 k_{14}^2 \\
& - k_1 k_2 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{13} - k_1 k_2 k_5 k_6 k_7^2 k_8 k_{10}^2 k_{13} - k_1 k_2 k_5 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} \\
& - k_1 k_2 k_5 k_6 k_7^2 k_{10}^2 k_{12} k_{13} - 2 k_1 k_2 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 2 k_1 k_2 k_5 k_6 k_7 k_8 \\
& k_{10}^2 k_{11} k_{13} - k_1 k_2 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - k_1 k_2 k_5 k_6 k_7 k_{10}^2 k_{11} k_{12} k_{13} \\
& - k_1 k_2 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13} - k_1 k_2 k_5 k_6 k_8 k_{10}^2 k_{11}^2 k_{13} - k_1 k_2 k_6^2 k_7^2 k_8 k_9 k_{10} k_{13} \\
& - k_1 k_2 k_6^2 k_7^2 k_8 k_{10}^2 k_{13} - k_1 k_2 k_6^2 k_7^2 k_9 k_{10} k_{12} k_{13} - k_1 k_2 k_6^2 k_7^2 k_{10}^2 k_{12} k_{13} - 2 k_1 k_2 \\
& k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 2 k_1 k_2 k_6^2 k_7 k_8 k_{10}^2 k_{11} k_{13} - k_1 k_2 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - k_1 k_2 \\
& k_6^2 k_7 k_{10}^2 k_{11} k_{12} k_{13} - k_1 k_2 k_6^2 k_8 k_9 k_{10} k_{11}^2 k_{13} - k_1 k_2 k_6^2 k_8 k_{10}^2 k_{11}^2 k_{13} - k_1 k_2 k_6 \\
& k_7^2 k_8 k_9 k_{10} k_{13} k_{14} - k_1 k_2 k_6 k_7^2 k_8 k_{10}^2 k_{13} k_{14} - k_1 k_2 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} k_{14} - k_1 k_2 k_6 k_7^2 \\
& k_{10}^2 k_{12} k_{13} k_{14} - 2 k_1 k_2 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_1 k_2 k_6 k_7 k_8 k_{10}^2 k_{11} k_{13} k_{14} \\
& - k_1 k_2 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - k_1 k_2 k_6 k_7 k_{10}^2 k_{11} k_{12} k_{13} k_{14} - k_1 k_2 k_6 k_8 k_9 k_{10} \\
& k_{11}^2 k_{13} k_{14} - k_1 k_2 k_6 k_8 k_{10}^2 k_{11}^2 k_{13} k_{14} - k_1 k_3^2 k_5^2 k_7 k_8 k_9 k_{10} k_{11} - k_1 k_3^2 k_5^2 k_7 k_8 k_{10}^2 k_{11} \\
& - k_1 k_3^2 k_5^2 k_7 k_9 k_{10} k_{11} k_{12} - k_1 k_3^2 k_5^2 k_7 k_{10}^2 k_{11} k_{12} - k_1 k_3^2 k_5^2 k_8 k_9 k_{10} k_{11}^2 - k_1 k_3^2 k_5^2 k_8 \\
& k_{10}^2 k_{11}^2 - 2 k_1 k_3^2 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} - 2 k_1 k_3^2 k_5 k_6 k_7 k_8 k_{10}^2 k_{11} - 2 k_1 \\
& k_3^2 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} - 2 k_1 k_3^2 k_5 k_6 k_7 k_{10}^2 k_{11} k_{12} - 2 k_1 k_3^2 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 - 2 k_1 \\
& k_3^2 k_5 k_6 k_8 k_{10}^2 k_{11}^2 - 2 k_1 k_3^2 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{14} - 2 k_1 k_3^2 k_5 k_7 k_8 k_{10}^2 k_{11} k_{14} - 2 k_1 \\
& k_3^2 k_5 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_3^2 k_5 k_7 k_{10}^2 k_{11} k_{12} k_{14} - 2 k_1 k_3^2 k_5 k_8 k_9 k_{10} k_{11}^2 k_{14} \\
& - 2 k_1 k_3^2 k_5 k_8 k_{10}^2 k_{11}^2 k_{14} - k_1 k_3^2 k_6^2 k_7 k_8 k_9 k_{10} k_{11} - k_1 k_3^2 k_6^2 k_7 k_8 k_{10}^2 k_{11} - k_1 k_3^2 \\
& k_6^2 k_7 k_9 k_{10} k_{11} k_{12} - k_1 k_3^2 k_6^2 k_7 k_{10}^2 k_{11} k_{12} - k_1 k_3^2 k_6^2 k_8 k_9 k_{10} k_{11}^2 - k_1 k_3^2 k_6^2 k_8 k_{10}^2 k_{11}^2 \\
& - 2 k_1 k_3^2 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{14} - 2 k_1 k_3^2 k_6 k_7 k_8 k_{10}^2 k_{11} k_{14} - 2 k_1 \\
& k_3^2 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_1 k_3^2 k_6 k_7 k_{10}^2 k_{11} k_{12} k_{14} - 2 k_1 k_3^2 k_6 k_8 k_9 k_{10} k_{11}^2 k_{14} \\
& - 2 k_1 k_3^2 k_6 k_8 k_{10}^2 k_{11}^2 k_{14} - k_1 k_3^2 k_7 k_8 k_9 k_{10} k_{11} k_{14}^2 - k_1 k_3^2 k_7 k_8 k_{10}^2 k_{11} k_{14}^2 - k_1 \\
& k_3^2 k_7 k_9 k_{10} k_{11} k_{12} k_{14}^2 - k_1 k_3^2 k_7 k_{10}^2 k_{11} k_{12} k_{14}^2 - k_1 k_3^2 k_8 k_9 k_{10} k_{11}^2 k_{14}^2 - k_1 k_3^2 k_8 k_{10}^2 k_{11}^2
\end{aligned}$$

$$\begin{aligned}
& k_{14}^2 - k_1 k_3 k_5^2 k_7 k_8 k_9 k_{10} k_{11} k_{13} - k_1 k_3 k_5^2 k_7 k_8 k_{10}^2 k_{11} k_{13} - k_1 k_3 k_5^2 k_7 k_9 k_{10} k_{11} k_{12} k_{13} \\
& - k_1 k_3 k_5^2 k_7 k_{10}^2 k_{11} k_{12} k_{13} - k_1 k_3 k_5^2 k_8 k_9 k_{10} k_{11}^2 k_{13} - k_1 k_3 k_5^2 k_8 k_{10}^2 k_{11}^2 k_{13} \\
& - k_1 k_3 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{13} - k_1 k_3 k_5 k_6 k_7^2 k_8 k_{10}^2 k_{13} - k_1 k_3 k_5 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} \\
& - k_1 k_3 k_5 k_6 k_7^2 k_{10}^2 k_{12} k_{13} - 4 k_1 k_3 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 4 k_1 k_3 k_5 k_6 k_7 k_8 \\
& k_{10}^2 k_{11} k_{13} - 3 k_1 k_3 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - 3 k_1 k_3 k_5 k_6 k_7 k_{10}^2 k_{11} k_{12} k_{13} \\
& - 3 k_1 k_3 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13} - 3 k_1 k_3 k_5 k_6 k_8 k_{10}^2 k_{11}^2 k_{13} \\
& - k_1 k_3 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{13} k_{14} - k_1 k_3 k_5 k_7 k_8 k_{10}^2 k_{11} k_{13} k_{14} \\
& - k_1 k_3 k_5 k_7 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - k_1 k_3 k_5 k_7 k_{10}^2 k_{11} k_{12} k_{13} k_{14} - k_1 k_3 k_5 k_8 k_9 k_{10} \\
& k_{11}^2 k_{13} k_{14} - k_1 k_3 k_5 k_8 k_{10}^2 k_{11}^2 k_{13} k_{14} - k_1 k_3 k_6^2 k_7^2 k_8 k_9 k_{10} k_{13} - k_1 k_3 k_6^2 k_7^2 k_8 k_{10}^2 k_{13} \\
& - k_1 k_3 k_6^2 k_7^2 k_9 k_{10} k_{12} k_{13} - k_1 k_3 k_6^2 k_7^2 k_{10}^2 k_{12} k_{13} - 3 k_1 k_3 k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{13} \\
& - 3 k_1 k_3 k_6^2 k_7 k_8 k_{10}^2 k_{11} k_{13} - 2 k_1 k_3 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_1 k_3 k_6^2 k_7 \\
& k_{10}^2 k_{11} k_{12} k_{13} - 2 k_1 k_3 k_6^2 k_8 k_9 k_{10} k_{11}^2 k_{13} - 2 k_1 k_3 k_6^2 k_8 k_{10}^2 k_{11}^2 k_{13} - k_1 k_3 k_6 \\
& k_7^2 k_8 k_9 k_{10} k_{13} k_{14} - k_1 k_3 k_6 k_7^2 k_8 k_{10}^2 k_{13} k_{14} - k_1 k_3 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} k_{14} - k_1 k_3 k_6 k_7^2 \\
& k_{10}^2 k_{12} k_{13} k_{14} - 3 k_1 k_3 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} k_{14} - 3 k_1 k_3 k_6 k_7 k_8 k_{10}^2 k_{11} k_{13} k_{14} \\
& - 2 k_1 k_3 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_3 k_6 k_7 k_{10}^2 k_{11} k_{12} k_{13} k_{14} \\
& - 2 k_1 k_3 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13} k_{14} - 2 k_1 k_3 k_6 k_8 k_{10}^2 k_{11}^2 k_{13} k_{14} - k_1 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{13}^2 \\
& - k_1 k_5 k_6 k_7^2 k_8 k_{10}^2 k_{13}^2 - k_1 k_5 k_6 k_7^2 k_9 k_{10} k_{12} k_{13}^2 - k_1 k_5 k_6 k_7^2 k_{10}^2 k_{12} k_{13}^2 \\
& - 2 k_1 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13}^2 - 2 k_1 k_5 k_6 k_7 k_8 k_{10}^2 k_{11} k_{13}^2 - k_1 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13}^2 \\
& - k_1 k_5 k_6 k_7 k_{10}^2 k_{11} k_{12} k_{13}^2 - k_1 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13}^2 - k_1 k_5 k_6 k_8 k_{10}^2 k_{11}^2 k_{13}^2 - k_1 k_6^2 \\
& k_7^2 k_8 k_9 k_{10} k_{13}^2 - k_1 k_6^2 k_7^2 k_8 k_{10}^2 k_{13}^2 - k_1 k_6^2 k_7^2 k_9 k_{10} k_{12} k_{13}^2 - k_1 k_6^2 k_7^2 k_{10}^2 k_{12} k_{13}^2 - 2 k_1 \\
& k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{13}^2 - 2 k_1 k_6^2 k_7 k_8 k_{10}^2 k_{11} k_{13}^2 - k_1 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} k_{13}^2 - k_1 k_6^2 k_7 \\
& k_{10}^2 k_{11} k_{12} k_{13}^2 - k_1 k_6^2 k_8 k_9 k_{10} k_{11}^2 k_{13}^2 - k_1 k_6^2 k_8 k_{10}^2 k_{11}^2 k_{13}^2 - k_2^2 k_4 k_5 k_6 k_7^2 k_8 k_9 - \\
& k_2^2 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{10} - k_2^2 k_4 k_5 k_6 k_7^2 k_9 k_{12} - k_2^2 k_4 k_5 k_6 k_7^2 k_9 k_{10} k_{12} - 2 k_2^2 k_4 k_5 k_6 k_7 k_8 \\
& k_9 k_{11} - 2 k_2^2 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} - k_2^2 k_4 k_5 k_6 k_7 k_9 k_{11} k_{12} - \\
& k_2^2 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} - k_2^2 k_4 k_5 k_6 k_8 k_9^2 k_{11} - k_2^2 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 - k_2^2 k_4 k_6^2 \\
& k_7^2 k_8 k_9^2 - k_2^2 k_4 k_6^2 k_7^2 k_8 k_9 k_{10} - k_2^2 k_4 k_6^2 k_7^2 k_9 k_{12} - k_2^2 k_4 k_6^2 k_7^2 k_9 k_{10} k_{12} - 2 k_2^2 k_4 k_6^2 k_7 k_8 \\
& k_9 k_{11} - 2 k_2^2 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{11} - k_2^2 k_4 k_6^2 k_7 k_9 k_{11} k_{12} - k_2^2 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} -
\end{aligned}$$

$$\begin{aligned}
& k_2^2 k_4 k_6^2 k_8 k_9^2 k_{11}^2 - k_2^2 k_4 k_6^2 k_8 k_9 k_{10} k_{11}^2 - k_2^2 k_4 k_6 k_7^2 k_8 k_9^2 k_{14} - k_2^2 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{14} \\
& - k_2^2 k_4 k_6 k_7^2 k_9^2 k_{12} k_{14} - k_2^2 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{14} - 2 k_2^2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{14} - 2 \\
& k_2^2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{14} - k_2^2 k_4 k_6 k_7 k_9^2 k_{11} k_{12} k_{14} - k_2^2 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - \\
& k_2^2 k_4 k_6 k_8 k_9^2 k_{11}^2 k_{14} - k_2^2 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 k_{14} - 2 k_2 k_3 k_4 k_5 k_6 k_7^2 k_8 k_9^2 \\
& - 2 k_2 k_3 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{10} - 2 k_2 k_3 k_4 k_5 k_6 k_7^2 k_9^2 k_{12} - 2 k_2 k_3 k_4 k_5 k_6 k_7^2 k_9 k_{10} k_{12} \\
& - 4 k_2 k_3 k_4 k_5 k_6 k_7 k_8 k_9^2 k_{11} - 4 k_2 k_3 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} - 2 k_2 k_3 k_4 k_5 k_6 k_7 \\
& k_9^2 k_{11} k_{12} - 2 k_2 k_3 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} - 2 k_2 k_3 k_4 k_5 k_6 k_8 k_9^2 k_{11}^2 \\
& - 2 k_2 k_3 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 - k_2 k_3 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{14} \\
& - k_2 k_3 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{14} - k_2 k_3 k_4 k_5 k_7 k_9^2 k_{11} k_{12} k_{14} \\
& - k_2 k_3 k_4 k_5 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - k_2 k_3 k_4 k_5 k_8 k_9^2 k_{11}^2 k_{14} - k_2 k_3 k_4 k_5 k_8 k_9 k_{10} k_{11}^2 k_{14} \\
& - 2 k_2 k_3 k_4 k_6^2 k_7^2 k_8 k_9^2 - 2 k_2 k_3 k_4 k_6^2 k_7^2 k_8 k_9 k_{10} - 2 k_2 k_3 k_4 k_6^2 k_7^2 k_9^2 k_{12} - 2 k_2 k_3 k_4 k_6^2 \\
& k_7^2 k_9 k_{10} k_{12} - 4 k_2 k_3 k_4 k_6^2 k_7 k_8 k_9^2 k_{11} - 4 k_2 k_3 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{11} - 2 k_2 k_3 k_4 k_6^2 k_7 \\
& k_9^2 k_{11} k_{12} - 2 k_2 k_3 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} - 2 k_2 k_3 k_4 k_6^2 k_8 k_9^2 k_{11}^2 - 2 k_2 k_3 k_4 k_6^2 k_8 k_9 k_{10} \\
& k_{11}^2 - 2 k_2 k_3 k_4 k_6 k_7^2 k_8 k_9^2 k_{14} - 2 k_2 k_3 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{14} - 2 k_2 k_3 k_4 k_6 k_7^2 k_9^2 k_{12} k_{14} \\
& - 2 k_2 k_3 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{14} - 5 k_2 k_3 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{14} \\
& - 5 k_2 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{14} - 3 k_2 k_3 k_4 k_6 k_7 k_9^2 k_{11} k_{12} k_{14} \\
& - 3 k_2 k_3 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - 3 k_2 k_3 k_4 k_6 k_8 k_9^2 k_{11}^2 k_{14} - 3 k_2 k_3 k_4 k_6 k_8 k_9 k_{10} \\
& k_{11}^2 k_{14} - k_2 k_3 k_4 k_7 k_8 k_9^2 k_{11} k_{14}^2 - k_2 k_3 k_4 k_7 k_8 k_9 k_{10} k_{11} k_{14}^2 - k_2 k_3 k_4 k_7 k_9^2 k_{11} k_{12} k_{14}^2 \\
& - k_2 k_3 k_4 k_7 k_9 k_{10} k_{11} k_{12} k_{14}^2 - k_2 k_3 k_4 k_8 k_9^2 k_{11}^2 k_{14}^2 - k_2 k_3 k_4 k_8 k_9 k_{10} k_{11}^2 k_{14}^2 \\
& - 2 k_2 k_4 k_5 k_6 k_7^2 k_8 k_9^2 k_{13} - 2 k_2 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{13} - 2 k_2 k_4 k_5 k_6 k_7^2 k_9^2 k_{12} k_{13} \\
& - 2 k_2 k_4 k_5 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} - 4 k_2 k_4 k_5 k_6 k_7 k_8 k_9^2 k_{11} k_{13} \\
& - 4 k_2 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} - 2 k_2 k_4 k_5 k_6 k_7 k_9^2 k_{11} k_{12} k_{13} \\
& - 2 k_2 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_2 k_4 k_5 k_6 k_8 k_9^2 k_{11}^2 k_{13} - 2 k_2 k_4 k_5 k_6 k_8 k_9 k_{10} \\
& k_{11}^2 k_{13} - 2 k_2 k_4 k_6^2 k_7^2 k_8 k_9^2 k_{13} - 2 k_2 k_4 k_6^2 k_7^2 k_8 k_9 k_{10} k_{13} - 2 k_2 k_4 k_6^2 k_7^2 k_9^2 k_{12} k_{13} \\
& - 2 k_2 k_4 k_6^2 k_7 k_9 k_{10} k_{12} k_{13} - 4 k_2 k_4 k_6^2 k_7 k_8 k_9^2 k_{11} k_{13} - 4 k_2 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{13} \\
& - 2 k_2 k_4 k_6^2 k_7 k_9^2 k_{11} k_{12} k_{13} - 2 k_2 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_2 k_4 k_6^2 k_8 k_9^2 k_{11}^2 k_{13} \\
& - 2 k_2 k_4 k_6^2 k_8 k_9 k_{10} k_{11}^2 k_{13} - k_2 k_4 k_6 k_7^2 k_8 k_9^2 k_{13} k_{14} - k_2 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{13} k_{14}
\end{aligned}$$

$$\begin{aligned}
& -k_2 k_4 k_6 k_7^2 k_9^2 k_{12} k_{13} k_{14} - k_2 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} k_{14} - 2 k_2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{13} k_{14} \\
& - 2 k_2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} k_{14} - k_2 k_4 k_6 k_7 k_9^2 k_{11} k_{12} k_{13} k_{14} \\
& - k_2 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - k_2 k_4 k_6 k_8 k_9^2 k_{11}^2 k_{13} k_{14} - k_2 k_4 k_6 k_8 k_9 k_{10} \\
& k_{11}^2 k_{13} k_{14} - k_3^2 k_4 k_5 k_6 k_7^2 k_8 k_9^2 - k_3^2 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{10} - k_3^2 k_4 k_5 k_6 k_7^2 k_9^2 k_{12} - \\
& k_3^2 k_4 k_5 k_6 k_7^2 k_9 k_{10} k_{12} - 2 k_3^2 k_4 k_5 k_6 k_7 k_8 k_9^2 k_{11} - 2 k_3^2 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} - \\
& k_3^2 k_4 k_5 k_6 k_7 k_9^2 k_{11} k_{12} - k_3^2 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} - k_3^2 k_4 k_5 k_6 k_8 k_9^2 k_{11}^2 - \\
& k_3^2 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 - k_3^2 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{14} - k_3^2 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{14} - \\
& k_3^2 k_4 k_5 k_7 k_9^2 k_{11} k_{12} k_{14} - k_3^2 k_4 k_5 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - k_3^2 k_4 k_5 k_8 k_9^2 k_{11}^2 k_{14} - \\
& k_3^2 k_4 k_5 k_8 k_9 k_{10} k_{11}^2 k_{14} - k_3^2 k_4 k_6^2 k_7^2 k_8 k_9^2 - k_3^2 k_4 k_6^2 k_7^2 k_8 k_9 k_{10} - k_3^2 k_4 k_6^2 k_7^2 k_9^2 k_{12} - \\
& k_3^2 k_4 k_6^2 k_7^2 k_9 k_{10} k_{12} - 2 k_3^2 k_4 k_6^2 k_7 k_8 k_9^2 k_{11} - 2 k_3^2 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{11} - k_3^2 k_4 k_6^2 k_7 \\
& k_9 k_{11} k_{12} - k_3^2 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} - k_3^2 k_4 k_6^2 k_8 k_9^2 k_{11}^2 - k_3^2 k_4 k_6^2 k_8 k_9 k_{10} k_{11}^2 - k_3^2 k_4 k_6 \\
& k_7^2 k_8 k_9^2 k_{14} - k_3^2 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{14} - k_3^2 k_4 k_6 k_7^2 k_9^2 k_{12} k_{14} - k_3^2 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{14} \\
& - 3 k_3^2 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{14} - 3 k_3^2 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{14} - 2 k_3^2 k_4 k_6 k_7 k_9^2 k_{11} k_{12} k_{14} \\
& - 2 k_3^2 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{14} - 2 k_3^2 k_4 k_6 k_8 k_9^2 k_{11}^2 k_{14} - 2 k_3^2 k_4 k_6 k_8 k_9 k_{10} k_{11}^2 k_{14} - \\
& k_3^2 k_4 k_7 k_8 k_9^2 k_{11}^2 k_{14} - k_3^2 k_4 k_7 k_8 k_9 k_{10} k_{11}^2 k_{14} - k_3^2 k_4 k_7 k_9^2 k_{11} k_{12} k_{14} - \\
& k_3^2 k_4 k_7 k_9 k_{10} k_{11} k_{12} k_{14}^2 - k_3^2 k_4 k_8 k_9^2 k_{11}^2 k_{14}^2 - k_3^2 k_4 k_8 k_9 k_{10} k_{11}^2 k_{14}^2 - 2 k_3 k_4 k_5 k_6 k_7^2 k_8 \\
& k_9^2 k_{13} - 2 k_3 k_4 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{13} - 2 k_3 k_4 k_5 k_6 k_7^2 k_9^2 k_{12} k_{13} - 2 k_3 k_4 k_5 k_6 \\
& k_7^2 k_9 k_{10} k_{12} k_{13} - 4 k_3 k_4 k_5 k_6 k_7 k_8 k_9^2 k_{11} k_{13} - 4 k_3 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} \\
& - 2 k_3 k_4 k_5 k_6 k_7 k_9^2 k_{11} k_{12} k_{13} - 2 k_3 k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_3 k_4 k_5 k_6 k_8 k_9^2 \\
& k_{11}^2 k_{13} - 2 k_3 k_4 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13} - k_3 k_4 k_5 k_7 k_8 k_9^2 k_{11} k_{13} k_{14} \\
& - k_3 k_4 k_5 k_7 k_8 k_9 k_{10} k_{11} k_{13} k_{14} - k_3 k_4 k_5 k_7 k_9^2 k_{11} k_{12} k_{13} k_{14} \\
& - k_3 k_4 k_5 k_7 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - k_3 k_4 k_5 k_8 k_9^2 k_{11}^2 k_{13} k_{14} - k_3 k_4 k_5 k_8 k_9 k_{10} \\
& k_{11}^2 k_{13} k_{14} - 2 k_3 k_4 k_6^2 k_7^2 k_8 k_9^2 k_{13} - 2 k_3 k_4 k_6^2 k_7^2 k_8 k_9 k_{10} k_{13} - 2 k_3 k_4 k_6^2 k_7^2 k_9^2 k_{12} k_{13} \\
& - 2 k_3 k_4 k_6^2 k_7^2 k_9 k_{10} k_{12} k_{13} - 4 k_3 k_4 k_6^2 k_7 k_8 k_9^2 k_{11} k_{13} - 4 k_3 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{13} \\
& - 2 k_3 k_4 k_6^2 k_7 k_9^2 k_{11} k_{12} k_{13} - 2 k_3 k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} k_{13} - 2 k_3 k_4 k_6^2 k_8 k_9^2 k_{11}^2 k_{13} \\
& - 2 k_3 k_4 k_6^2 k_8 k_9 k_{10} k_{11}^2 k_{13} - k_3 k_4 k_6 k_7^2 k_8 k_9^2 k_{13} k_{14} - k_3 k_4 k_6 k_7^2 k_8 k_9 k_{10} k_{13} k_{14} \\
& - k_3 k_4 k_6 k_7^2 k_9^2 k_{12} k_{13} k_{14} - k_3 k_4 k_6 k_7^2 k_9 k_{10} k_{12} k_{13} k_{14} - 3 k_3 k_4 k_6 k_7 k_8 k_9^2 k_{11} k_{13} k_{14}
\end{aligned}$$

$$\begin{aligned}
& -3 k_3 k_4 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13} k_{14} - 2 k_3 k_4 k_6 k_7 k_9^2 k_{11} k_{12} k_{13} k_{14} \\
& - 2 k_3 k_4 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13} k_{14} - 2 k_3 k_4 k_6 k_8 k_9^2 k_{11} k_{13} k_{14} - 2 k_3 k_4 k_6 k_8 k_9 k_{10} \\
& k_{11}^2 k_{13} k_{14} - k_4 k_5 k_6 k_7^2 k_8 k_9^2 k_{13}^2 - k_4 k_5 k_6 k_7^2 k_8 k_9 k_{10} k_{13}^2 - k_4 k_5 k_6 k_7^2 k_9^2 k_{12} k_{13}^2 \\
& - k_4 k_5 k_6 k_7^2 k_9 k_{10} k_{12} k_{13}^2 - 2 k_4 k_5 k_6 k_7 k_8 k_9^2 k_{11} k_{13}^2 - 2 k_4 k_5 k_6 k_7 k_8 k_9 k_{10} k_{11} k_{13}^2 \\
& - k_4 k_5 k_6 k_7 k_9^2 k_{11} k_{12} k_{13}^2 - k_4 k_5 k_6 k_7 k_9 k_{10} k_{11} k_{12} k_{13}^2 - k_4 k_5 k_6 k_8 k_9^2 k_{11}^2 k_{13}^2 \\
& - k_4 k_5 k_6 k_8 k_9 k_{10} k_{11}^2 k_{13}^2 - k_4 k_6^2 k_7^2 k_8 k_9^2 k_{13}^2 - k_4 k_6^2 k_7^2 k_8 k_9 k_{10} k_{13}^2 - k_4 k_6^2 k_7^2 k_9^2 k_{12} k_{13}^2 \\
& - k_4 k_6^2 k_7^2 k_9 k_{10} k_{12} k_{13}^2 - 2 k_4 k_6^2 k_7 k_8 k_9^2 k_{11} k_{13}^2 - 2 k_4 k_6^2 k_7 k_8 k_9 k_{10} k_{11} k_{13}^2 - k_4 k_6^2 k_7 \\
& k_9^2 k_{11} k_{12} k_{13}^2 - k_4 k_6^2 k_7 k_9 k_{10} k_{11} k_{12} k_{13}^2 - k_4 k_6^2 k_8 k_9^2 k_{11} k_{13}^2 - k_4 k_6^2 k_8 k_9 k_{10} k_{11}^2 k_{13}^2) x_5
\end{aligned}$$

>

> # there is only one coefficient term with both positive and negative sign: (should check literature to find the critiria)

>

> term := $\left(-k_1^2 k_3^2 k_4 k_5 k_8^2 k_{10} k_{11} - k_1^2 k_3^2 k_4 k_5 k_8^2 k_{11}^2 - k_1^2 k_3^2 k_4 k_5 k_8 k_{10} k_{11}^2 - k_1^2 k_3^2 k_4 k_5 k_8 k_{10} k_{11}^2 - k_1^2 k_3^2 k_4 k_6 k_8^2 k_{10} k_{11} - k_1^2 k_3^2 k_4 k_6 k_8^2 k_{11}^2 - k_1^2 k_3^2 k_4 k_6 k_8 k_{10} k_{11}^2 - k_1^2 k_3^2 k_4 k_6 k_8 k_{10} k_{11} k_{12} - k_1^2 k_3^2 k_4 k_8^2 k_{10} k_{11} k_{14} - k_1^2 k_3^2 k_4 k_8^2 k_{11}^2 k_{14} - k_1^2 k_3^2 k_4 k_8 k_{10} k_{11}^2 k_{14} - k_1^2 k_3^2 k_4 k_8 k_{10} k_{11} k_{12} k_{14} + k_1^2 k_3 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} - k_1^2 k_3 k_4 k_5 k_6 k_7 k_8 k_{11} k_{12} + k_1^2 k_3 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 + k_1^2 k_3 k_4 k_5 k_6 k_8 k_{10} k_{11} k_{12} - k_1^2 k_3 k_4 k_5 k_7 k_8^2 k_{10} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_7 k_8^2 k_{11} k_{13} - k_1^2 k_3 k_4 k_5 k_7 k_8 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_7 k_8 k_{10} k_{12} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_7 k_8 k_{11} k_{12} k_{14} - k_1^2 k_3 k_4 k_5 k_7 k_{10} k_{11} k_{12} k_{13} - k_1^2 k_3 k_4 k_5 k_7 k_{10} k_{12} k_{13} - k_1^2 k_3 k_4 k_5 k_8^2 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_5 k_8^2 k_{11}^2 k_{13} - k_1^2 k_3 k_4 k_5 k_8^2 k_{11} k_{14} - k_1^2 k_3 k_4 k_5 k_8 k_{10} k_{11}^2 k_{13} - k_1^2 k_3 k_4 k_5 k_8 k_{10} k_{11} k_{12} k_{13} + k_1^2 k_3 k_4 k_6^2 k_7 k_8 k_{10} k_{11} - k_1^2 k_3 k_4 k_6^2 k_7 k_8 k_{11} k_{12} + k_1^2 k_3 k_4 k_6^2 k_8 k_{10} k_{11}^2 + k_1^2 k_3 k_4 k_6^2 k_8 k_{10} k_{11} k_{12} - k_1^2 k_3 k_4 k_6 k_7 k_8^2 k_{10} k_{13} - 2 k_1^2 k_3 k_4 k_6 k_7 k_8^2 k_{11} k_{13} - k_1^2 k_3 k_4 k_6 k_7 k_8^2 k_{11} k_{14} - k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{13} + k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{11} k_{14} - k_1^2 k_3 k_4 k_6 k_7 k_8 k_{10} k_{12} k_{13} - k_1^2 k_3 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13} - 2 k_1^2 k_3 k_4 k_6 k_8^2 k_{11} k_{13} - k_1^2 k_3 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{14} - k_1^2 k_3 k_4 k_6 k_8^2 k_{10} k_{11} k_{13} - 2 k_1^2 k_3 k_4 k_6 k_8^2 k_{11}^2 k_{13} - k_1^2 k_3 k_4 k_6 k_8^2 k_{11} k_{14} - k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11}^2 k_{14} - k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11} k_{12} k_{13} + k_1^2 k_3 k_4 k_6 k_8 k_{10} k_{11} k_{12} k_{14} - k_1^2 k_3 k_4 k_7 k_8^2 k_{11} k_{13} k_{14} - k_1^2 k_3 k_4 k_7 k_8^2 k_{11} k_{14}^2 - k_1^2 k_3 k_4 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_3 k_4 k_7 k_8 k_{11} k_{12} k_{14}^2 - k_1^2 k_3 k_4 k_8^2 k_{11} k_{13} k_{14} - k_1^2 k_3 k_4 k_8^2 k_{11}^2 k_{14} + k_1^2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{13} - k_1^2 k_4 k_5 k_6 k_7 k_8 k_{12} k_{13} + k_1^2 k_4 k_5 k_6 k_7^2 k_{10} k_{12} k_{13} - k_1^2 k_4 k_5 k_6 k_7^2 k_{12} k_{13} + 2 k_1^2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13} + k_1^2 k_4 k_5 k_6 k_7 k_8 k_{10} k_{12} k_{13} - k_1^2 k_4 k_5 k_6 k_7 k_8 k_{11} k_{12} k_{13} + k_1^2 k_4 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13} +$

$$\begin{aligned}
& k_1^2 k_4 k_5 k_6 k_7 k_{10} k_{12}^2 k_{13} + k_1^2 k_4 k_5 k_6 k_8 k_{10} k_{11}^2 k_{13} + k_1^2 k_4 k_5 k_6 k_8 k_{10} k_{11} k_{12} k_{13} - \\
& k_1^2 k_4 k_5 k_7^2 k_8^2 k_{13} - k_1^2 k_4 k_5 k_7^2 k_8^2 k_{13} k_{14} - 2 k_1^2 k_4 k_5 k_7^2 k_8 k_{12} k_{13} - 2 k_1^2 k_4 k_5 \\
& k_7^2 k_8 k_{12} k_{13} k_{14} - k_1^2 k_4 k_5 k_7^2 k_{12}^2 k_{13} - k_1^2 k_4 k_5 k_7^2 k_{12}^2 k_{13} k_{14} - 2 k_1^2 k_4 k_5 k_7 k_8^2 k_{11} k_{13} - 2 \\
& k_1^2 k_4 k_5 k_7 k_8^2 k_{11} k_{13} k_{14} - 2 k_1^2 k_4 k_5 k_7 k_8 k_{11} k_{12} k_{13}^2 - 2 k_1^2 k_4 k_5 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - \\
& k_1^2 k_4 k_5 k_8^2 k_{11}^2 k_{13} - k_1^2 k_4 k_5 k_8^2 k_{11}^2 k_{13} k_{14} + k_1^2 k_4 k_6^2 k_7^2 k_8 k_{10} k_{13} - k_1^2 k_4 k_6^2 k_7^2 k_8 k_{12} k_{13} \\
& + 2 k_1^2 k_4 k_6^2 k_7 k_8 k_{10} k_{11} k_{13} + k_1^2 k_4 k_6^2 k_7 k_8 k_{10} k_{12} k_{13} - k_1^2 k_4 k_6^2 k_7 k_8 k_{11} k_{12} k_{13} + k_1^2 k_4 \\
& k_6^2 k_8 k_{10} k_{11}^2 k_{13} + k_1^2 k_4 k_6^2 k_8 k_{10} k_{11} k_{12} k_{13} - k_1^2 k_4 k_6 k_7^2 k_8^2 k_{13} - k_1^2 k_4 k_6 k_7^2 k_8^2 k_{13} k_{14} - \\
& k_1^2 k_4 k_6 k_7^2 k_8 k_{12} k_{13}^2 - k_1^2 k_4 k_6 k_7^2 k_8 k_{12} k_{13} k_{14} - 2 k_1^2 k_4 k_6 k_7 k_8^2 k_{11} k_{13}^2 - 2 k_1^2 k_4 k_6 k_7 \\
& k_8^2 k_{11} k_{13} k_{14} - k_1^2 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13}^2 - k_1^2 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - k_1^2 k_4 k_6 k_8^2 k_{11}^2 k_{13}^2 \\
& - k_1^2 k_4 k_6 k_8^2 k_{11}^2 k_{13} k_{14} + k_1 k_2 k_3 k_4^2 k_6 k_7 k_8 k_9 k_{12} - k_1 k_2 k_3 k_4^2 k_6 k_7 k_8 k_{11} k_{12} + k_1 k_2 k_3 \\
& k_4^2 k_6 k_7 k_9 k_{11} k_{12} + k_1 k_2 k_3 k_4^2 k_6 k_7 k_9 k_{12}^2 + k_1 k_2 k_3 k_4^2 k_7 k_8^2 k_9 k_{14} - k_1 k_2 k_3 k_4^2 k_7 \\
& k_8^2 k_{11} k_{14} + k_1 k_2 k_3 k_4^2 k_7 k_8 k_9 k_{11} k_{14} + 2 k_1 k_2 k_3 k_4^2 k_7 k_8 k_9 k_{12} k_{14} - k_1 k_2 k_3 \\
& k_4^2 k_7 k_8 k_{11} k_{12} k_{14} + k_1 k_2 k_3 k_4^2 k_7 k_9 k_{11} k_{12} k_{14} + k_1 k_2 k_3 k_4^2 k_7 k_9 k_{12}^2 k_{14} + k_1 k_2 k_3 k_4^2 \\
& k_8 k_9 k_{11} k_{14} - k_1 k_2 k_3 k_4^2 k_8^2 k_{11} k_{14} + k_1 k_2 k_3 k_4^2 k_8 k_9 k_{11} k_{14} + k_1 k_2 k_3 k_4^2 k_8 k_9 k_{11} k_{12} k_{14} \\
& - k_1 k_2 k_4^2 k_6^2 k_7^2 k_9 k_{12} - k_1 k_2 k_4^2 k_6^2 k_7^2 k_{12}^2 - k_1 k_2 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} - k_1 k_2 k_4^2 k_6^2 k_7 k_9 k_{12}^2 \\
& - k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_9 k_{14} - k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_{12} k_{13} - 2 k_1 k_2 k_4^2 k_6 k_7^2 k_8 k_{12} k_{14} - k_1 k_2 \\
& k_4^2 k_6 k_7^2 k_9 k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7^2 k_{12}^2 k_{13} - 2 k_1 k_2 k_4^2 k_6 k_7^2 k_{12}^2 k_{14} - 2 k_1 k_2 \\
& k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{14} - k_1 k_2 k_4^2 k_6 k_7 k_8 k_9 k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7 k_8 k_{11} k_{12} k_{13} - 2 k_1 k_2 \\
& k_4^2 k_6 k_7 k_8 k_{11} k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{14} - k_1 k_2 k_4^2 k_6 k_7 k_9 k_{12}^2 k_{14} - k_1 k_2 \\
& k_4^2 k_6 k_8 k_9 k_{11}^2 k_{14} - k_1 k_2 k_4^2 k_6 k_8 k_9 k_{11} k_{12} k_{14} - k_1 k_2 k_4^2 k_7^2 k_8^2 k_{13} k_{14} - k_1 k_2 k_4^2 k_7^2 k_8^2 k_{14}^2 \\
& - 2 k_1 k_2 k_4^2 k_7^2 k_8 k_{12} k_{13} k_{14} - 2 k_1 k_2 k_4^2 k_7^2 k_8 k_{12} k_{14}^2 - k_1 k_2 k_4^2 k_7^2 k_{12}^2 k_{13} k_{14} - k_1 k_2 k_4^2 k_7^2 k_{12}^2 k_{14}^2 \\
& k_{12}^2 k_{14}^2 - 2 k_1 k_2 k_4^2 k_7 k_8^2 k_{11} k_{13} k_{14} - 2 k_1 k_2 k_4^2 k_7 k_8^2 k_{11} k_{14}^2 - 2 k_1 k_2 \\
& k_4^2 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - 2 k_1 k_2 k_4^2 k_7 k_8 k_{11} k_{12} k_{14}^2 - k_1 k_2 k_4^2 k_8^2 k_{11}^2 k_{13} k_{14} - k_1 k_2 k_4^2 k_8^2 \\
& k_{11}^2 k_{14}^2 + k_1 k_3^2 k_4^2 k_6 k_7 k_8 k_9 k_{12} - k_1 k_3^2 k_4^2 k_6 k_7 k_8 k_{11} k_{12} + k_1 k_3^2 k_4^2 k_6 k_7 k_9 k_{11} k_{12} + k_1 k_3^2 \\
& k_4^2 k_6 k_7 k_9 k_{12}^2 + k_1 k_3^2 k_4^2 k_7 k_8^2 k_9 k_{14} - k_1 k_3^2 k_4^2 k_7 k_8^2 k_{11} k_{14} + k_1 k_3^2 k_4^2 k_7 k_8 k_9 k_{11} k_{14} \\
& + 2 k_1 k_3^2 k_4^2 k_7 k_8 k_9 k_{12} k_{14} - k_1 k_3^2 k_4^2 k_7 k_8 k_{11} k_{12} k_{14} + k_1 k_3^2 k_4^2 k_7 k_9 k_{11} k_{12} k_{14} + k_1 k_3^2 \\
& k_4^2 k_7 k_9 k_{12}^2 k_{14} - k_1 k_3 k_4^2 k_6^2 k_7^2 k_9 k_{12} - k_1 k_3 k_4^2 k_6^2 k_7^2 k_{12}^2 - k_1 k_3 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} - k_1 k_3 \\
& k_4^2 k_6^2 k_7 k_9 k_{12}^2 - k_1 k_3 k_4^2 k_6 k_7^2 k_8 k_9 k_{14} - k_1 k_3 k_4^2 k_6 k_7^2 k_8 k_{12} k_{13} - 2 k_1 k_3 k_4^2 k_6 \\
& k_7^2 k_8 k_{12} k_{14} - k_1 k_3 k_4^2 k_6 k_7^2 k_9 k_{12} k_{14} - k_1 k_3 k_4^2 k_6 k_7^2 k_{12}^2 k_{13} - 2 k_1 k_3 k_4^2 k_6 k_7^2 k_{12}^2 k_{14} \\
& - k_1 k_3 k_4^2 k_6 k_7 k_8 k_9 k_{11} k_{14} + k_1 k_3 k_4^2 k_6 k_7 k_8 k_9 k_{12} k_{13} - k_1 k_3 k_4^2 k_6 k_7 k_8 k_9 k_{12} k_{14} \\
& - 2 k_1 k_3 k_4^2 k_6 k_7 k_8 k_{11} k_{12} k_{13} - k_1 k_3 k_4^2 k_6 k_7 k_8 k_{11} k_{12} k_{14} + k_1 k_3 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{13} \\
& - k_1 k_3 k_4^2 k_6 k_7 k_9 k_{11} k_{12} k_{14} + k_1 k_3 k_4^2 k_6 k_7 k_9 k_{12}^2 k_{13} - k_1 k_3 k_4^2 k_6 k_7 k_9 k_{12}^2 k_{14} - k_1 k_3
\end{aligned}$$

$$\begin{aligned}
& k_4^2 k_7^2 k_8^2 k_{13} k_{14} - k_1 k_3 k_4^2 k_7^2 k_8^2 k_{14}^2 - 2 k_1 k_3 k_4^2 k_7^2 k_8 k_{12} k_{13} k_{14} - 2 k_1 k_3 k_4^2 k_7^2 k_8 k_{12} k_{14}^2 \\
& - k_1 k_3 k_4^2 k_7^2 k_{12}^2 k_{13} k_{14} - k_1 k_3 k_4^2 k_7^2 k_{12}^2 k_{14}^2 - k_1 k_3 k_4^2 k_7 k_8^2 k_{11} k_{13} k_{14} - k_1 k_3 k_4^2 k_7 k_8^2 k_{11} k_{14}^2 \\
& - k_1 k_3 k_4^2 k_7 k_8 k_{11} k_{12} k_{13} k_{14} - k_1 k_3 k_4^2 k_7 k_8 k_{11} k_{12} k_{14}^2 - k_1 k_4^2 k_6^2 k_7^2 k_9 k_{12} k_{13} - k_1 k_4^2 k_6^2 k_7^2 k_{12}^2 k_{13} \\
& - k_1 k_4^2 k_6^2 k_7^2 k_{12}^2 k_{13}^2 - k_1 k_4^2 k_6^2 k_7 k_9 k_{11} k_{12} k_{13} - k_1 k_4^2 k_6^2 k_7 k_9 k_{12}^2 k_{13} - k_1 k_4^2 k_6^2 k_7 k_8 k_{12} k_{13}^2 \\
& - k_1 k_4^2 k_6 k_7^2 k_8 k_{12} k_{13} k_{14} - k_1 k_4^2 k_6 k_7^2 k_{12}^2 k_{13}^2 - k_1 k_4^2 k_6 k_7^2 k_{12}^2 k_{13} k_{14} - k_1 k_4^2 k_6 k_7 k_8 k_{11} k_{12} k_{13} k_{14} \Big) :
\end{aligned}$$

> factor(term)

$$\begin{aligned}
& -k_1 k_4 \left(k_1 k_3^2 k_5 k_8 k_{10} k_{11} + k_1 k_3^2 k_5 k_8 k_{11}^2 + k_1 k_3^2 k_5 k_8 k_{10} k_{11}^2 + k_1 k_3^2 k_5 k_8 k_{10} k_{11} k_{12} + k_1 k_3^2 k_6 k_8 k_{10} k_{11} + k_1 k_3^2 k_6 k_8 k_{11}^2 + k_1 k_3^2 k_6 k_8 k_{10} k_{11}^2 + k_1 k_3^2 k_6 k_8 k_{10} k_{11} k_{12} + k_1 k_3^2 k_8 k_{10} k_{11} k_{14} + k_1 k_3^2 k_8 k_{11}^2 k_{14} + k_1 k_3^2 k_8 k_{10} k_{11}^2 k_{14} + k_1 k_3^2 k_8 k_{10} k_{11} k_{12} k_{14} \right. \\
& - k_1 k_3 k_5 k_6 k_7 k_8 k_{10} k_{11} + k_1 k_3 k_5 k_6 k_7 k_8 k_{11} k_{12} - k_1 k_3 k_5 k_6 k_8 k_{10} k_{11}^2 \\
& - k_1 k_3 k_5 k_6 k_8 k_{10} k_{11} k_{12} + k_1 k_3 k_5 k_7 k_8^2 k_{10} k_{13} + 2 k_1 k_3 k_5 k_7 k_8^2 k_{11} k_{13} + k_1 k_3 k_5 k_7 k_8^2 k_{11} k_{14} + k_1 k_3 k_5 k_7 k_8 k_{10} k_{11} k_{13} + 2 k_1 k_3 k_5 k_7 k_8 k_{10} k_{12} k_{13} \\
& + 2 k_1 k_3 k_5 k_7 k_8 k_{11} k_{12} k_{13} + k_1 k_3 k_5 k_7 k_8 k_{11} k_{12} k_{14} + k_1 k_3 k_5 k_7 k_{10} k_{11} k_{12} k_{13} \\
& + k_1 k_3 k_5 k_7 k_{10} k_{12}^2 k_{13} + k_1 k_3 k_5 k_8^2 k_{10} k_{11} k_{13} + 2 k_1 k_3 k_5 k_8^2 k_{11}^2 k_{13} + k_1 k_3 k_5 k_8^2 k_{11} k_{14} + k_1 k_3 k_5 k_8 k_{10} k_{11}^2 k_{13} + k_1 k_3 k_5 k_8 k_{10} k_{11} k_{12} k_{13} - k_1 k_3 k_6^2 k_7 k_8 k_{10} k_{11} + k_1 k_3 k_6^2 k_7 k_8 k_{11} k_{12} - k_1 k_3 k_6^2 k_8 k_{10} k_{11}^2 - k_1 k_3 k_6^2 k_8 k_{10} k_{11} k_{12} + k_1 k_3 k_6 k_7 k_8^2 k_{10} k_{13} \\
& + 2 k_1 k_3 k_6 k_7 k_8^2 k_{11} k_{13} + k_1 k_3 k_6 k_7 k_8^2 k_{11} k_{14} + k_1 k_3 k_6 k_7 k_8 k_{10} k_{11} k_{13} \\
& - k_1 k_3 k_6 k_7 k_8 k_{10} k_{11} k_{14} + k_1 k_3 k_6 k_7 k_8 k_{10} k_{12} k_{13} + k_1 k_3 k_6 k_7 k_8 k_{11} k_{12} k_{13} \\
& + 2 k_1 k_3 k_6 k_7 k_8 k_{11} k_{12} k_{14} + k_1 k_3 k_6 k_8^2 k_{10} k_{11} k_{13} + 2 k_1 k_3 k_6 k_8^2 k_{11}^2 k_{13} + k_1 k_3 k_6 k_8^2 k_{11} k_{14} + k_1 k_3 k_6 k_8 k_{10} k_{11}^2 k_{13} - k_1 k_3 k_6 k_8 k_{10} k_{11}^2 k_{14} + k_1 k_3 k_6 k_8 k_{10} k_{11} k_{12} k_{13} \\
& - k_1 k_3 k_6 k_8 k_{10} k_{11} k_{12} k_{14} + k_1 k_3 k_7 k_8^2 k_{11} k_{13} k_{14} + k_1 k_3 k_7 k_8^2 k_{11} k_{14}^2 \\
& + k_1 k_3 k_7 k_8 k_{11} k_{12} k_{13} k_{14} + k_1 k_3 k_7 k_8 k_{11} k_{12} k_{14}^2 + k_1 k_3 k_8^2 k_{11}^2 k_{13} k_{14} + k_1 k_3 k_8^2 k_{11}^2 k_{14}^2 \\
& - k_1 k_5 k_6 k_7^2 k_8 k_{10} k_{13} + k_1 k_5 k_6 k_7^2 k_8 k_{12} k_{13} - k_1 k_5 k_6 k_7^2 k_{10} k_{12} k_{13} + k_1 k_5 k_6 k_7^2 k_{12}^2 k_{13} - 2 k_1 k_5 k_6 k_7 k_8 k_{10} k_{11} k_{13} - k_1 k_5 k_6 k_7 k_8 k_{10} k_{12} k_{13} + k_1 k_5 k_6 k_7 k_8 k_{11} k_{12} k_{13} \\
& - k_1 k_5 k_6 k_7 k_{10} k_{11} k_{12} k_{13} - k_1 k_5 k_6 k_7 k_{10} k_{12}^2 k_{13} - k_1 k_5 k_6 k_8 k_{10} k_{11}^2 k_{13} \\
& - k_1 k_5 k_6 k_8 k_{10} k_{11} k_{12} k_{13} + k_1 k_5 k_7^2 k_8^2 k_{13}^2 + k_1 k_5 k_7^2 k_8^2 k_{13} k_{14} + 2 k_1 k_5 k_7^2 k_8 k_{12} k_{13}^2 \\
& + 2 k_1 k_5 k_7^2 k_8 k_{12} k_{13} k_{14} + k_1 k_5 k_7^2 k_{12}^2 k_{13}^2 + k_1 k_5 k_7^2 k_{12}^2 k_{13} k_{14} + 2 k_1 k_5 k_7 k_8^2 k_{11} k_{13}^2
\end{aligned} \tag{10}$$

$$\begin{aligned}
& + 2 k_1 k_5 k_7 k_8^2 k_{11} k_{13} k_{14} + 2 k_1 k_5 k_7 k_8 k_{11} k_{12} k_{13}^2 + 2 k_1 k_5 k_7 k_8 k_{11} k_{12} k_{13} k_{14} + k_1 k_5 \\
& k_8^2 k_{11}^2 k_{13}^2 + k_1 k_5 k_8^2 k_{11}^2 k_{13} k_{14} - k_1 k_6^2 k_7^2 k_8 k_{10} k_{13} + k_1 k_6^2 k_7^2 k_8 k_{12} k_{13} - 2 k_1 \\
& k_6^2 k_7 k_8 k_{10} k_{11} k_{13} - k_1 k_6^2 k_7 k_8 k_{10} k_{12} k_{13} + k_1 k_6^2 k_7 k_8 k_{11} k_{12} k_{13} - k_1 k_6^2 k_8 k_{10} k_{11}^2 k_{13} \\
& - k_1 k_6^2 k_8 k_{10} k_{11} k_{12} k_{13} + k_1 k_6 k_7^2 k_8^2 k_{13}^2 + k_1 k_6 k_7^2 k_8^2 k_{13} k_{14} + k_1 k_6 k_7^2 k_8 k_{12} k_{13}^2 \\
& + k_1 k_6 k_7^2 k_8 k_{12} k_{13} k_{14} + 2 k_1 k_6 k_7 k_8^2 k_{11} k_{13}^2 + 2 k_1 k_6 k_7 k_8^2 k_{11} k_{13} k_{14} \\
& + k_1 k_6 k_7 k_8 k_{11} k_{12} k_{13}^2 + k_1 k_6 k_7 k_8 k_{11} k_{12} k_{13} k_{14} + k_1 k_6 k_8^2 k_{11}^2 k_{13}^2 + k_1 k_6 k_8^2 \\
& k_{11}^2 k_{13} k_{14} - k_2 k_3 k_4 k_6 k_7 k_8 k_9 k_{12} + k_2 k_3 k_4 k_6 k_7 k_8 k_{11} k_{12} - k_2 k_3 k_4 k_6 k_7 k_9 k_{11} k_{12} \\
& - k_2 k_3 k_4 k_6 k_7 k_9 k_{12}^2 - k_2 k_3 k_4 k_7 k_8^2 k_9 k_{14} + k_2 k_3 k_4 k_7 k_8^2 k_{11} k_{14} \\
& - k_2 k_3 k_4 k_7 k_8 k_9 k_{11} k_{14} - 2 k_2 k_3 k_4 k_7 k_8 k_9 k_{12} k_{14} + k_2 k_3 k_4 k_7 k_8 k_{11} k_{12} k_{14} \\
& - k_2 k_3 k_4 k_7 k_9 k_{11} k_{12} k_{14} - k_2 k_3 k_4 k_7 k_9 k_{12}^2 k_{14} - k_2 k_3 k_4 k_8^2 k_9 k_{11} k_{14} + k_2 k_3 k_4 k_8^2 \\
& k_{11}^2 k_{14} - k_2 k_3 k_4 k_8 k_9 k_{11}^2 k_{14} - k_2 k_3 k_4 k_8 k_9 k_{11} k_{12} k_{14} + k_2 k_4 k_6^2 k_7^2 k_9 k_{12} + k_2 k_4 k_6^2 k_7^2 \\
& k_{12}^2 + k_2 k_4 k_6^2 k_7 k_9 k_{11} k_{12} + k_2 k_4 k_6^2 k_7 k_9 k_{12}^2 + k_2 k_4 k_6 k_7^2 k_8 k_9 k_{14} + k_2 k_4 k_6 \\
& k_7^2 k_8 k_{12} k_{13} + 2 k_2 k_4 k_6 k_7^2 k_8 k_{12} k_{14} + k_2 k_4 k_6 k_7^2 k_9 k_{12} k_{14} + k_2 k_4 k_6 k_7^2 k_{12}^2 k_{13} \\
& + 2 k_2 k_4 k_6 k_7^2 k_{12}^2 k_{14} + 2 k_2 k_4 k_6 k_7 k_8 k_9 k_{11} k_{14} + k_2 k_4 k_6 k_7 k_8 k_9 k_{12} k_{14} \\
& + k_2 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13} + 2 k_2 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{14} + k_2 k_4 k_6 k_7 k_9 k_{11} k_{12} k_{14} \\
& + k_2 k_4 k_6 k_7 k_9 k_{12}^2 k_{14} + k_2 k_4 k_6 k_8 k_9 k_{11}^2 k_{14} + k_2 k_4 k_6 k_8 k_9 k_{11} k_{12} k_{14} + k_2 k_4 k_7^2 \\
& k_8 k_{13} k_{14} + k_2 k_4 k_7^2 k_8^2 k_{14}^2 + 2 k_2 k_4 k_7^2 k_8 k_{12} k_{13} k_{14} + 2 k_2 k_4 k_7^2 k_8 k_{12} k_{14}^2 + k_2 k_4 k_7^2 \\
& k_{12}^2 k_{13} k_{14} + k_2 k_4 k_7^2 k_{12}^2 k_{14}^2 + 2 k_2 k_4 k_7 k_8^2 k_{11} k_{13} k_{14} + 2 k_2 k_4 k_7 k_8^2 k_{11} k_{14}^2 \\
& + 2 k_2 k_4 k_7 k_8 k_{11} k_{12} k_{13} k_{14} + 2 k_2 k_4 k_7 k_8 k_{11} k_{12} k_{14}^2 + k_2 k_4 k_8^2 k_{11}^2 k_{13} k_{14} + k_2 k_4 k_8^2 \\
& k_{11}^2 k_{14}^2 - k_3^2 k_4 k_6 k_7 k_8 k_9 k_{12} + k_3^2 k_4 k_6 k_7 k_8 k_{11} k_{12} - k_3^2 k_4 k_6 k_7 k_9 k_{11} k_{12} - \\
& k_3^2 k_4 k_6 k_7 k_9 k_{12}^2 - k_3^2 k_4 k_7 k_8^2 k_9 k_{14} + k_3^2 k_4 k_7 k_8^2 k_{11} k_{14} - k_3^2 k_4 k_7 k_8 k_9 k_{11} k_{14} - 2 \\
& k_3^2 k_4 k_7 k_8 k_9 k_{12} k_{14} + k_3^2 k_4 k_7 k_8 k_{11} k_{12} k_{14} - k_3^2 k_4 k_7 k_9 k_{11} k_{12} k_{14} - k_3^2 k_4 k_7 k_9 k_{12}^2 k_{14} \\
& + k_3 k_4 k_6^2 k_7^2 k_9 k_{12} + k_3 k_4 k_6^2 k_7^2 k_{12}^2 + k_3 k_4 k_6^2 k_7 k_9 k_{11} k_{12} + k_3 k_4 k_6^2 k_7 k_9 k_{12}^2 + k_3 k_4 k_6 \\
& k_7^2 k_8 k_9 k_{14} + k_3 k_4 k_6 k_7^2 k_8 k_{12} k_{13} + 2 k_3 k_4 k_6 k_7^2 k_8 k_{12} k_{14} + k_3 k_4 k_6 k_7^2 k_9 k_{12} k_{14} \\
& + k_3 k_4 k_6 k_7^2 k_{12}^2 k_{13} + 2 k_3 k_4 k_6 k_7^2 k_{12}^2 k_{14} + k_3 k_4 k_6 k_7 k_8 k_9 k_{11} k_{14} \\
& - k_3 k_4 k_6 k_7 k_8 k_9 k_{12} k_{13} + k_3 k_4 k_6 k_7 k_8 k_9 k_{12} k_{14} + 2 k_3 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13} \\
& + k_3 k_4 k_6 k_7 k_8 k_{11} k_{12} k_{14} - k_3 k_4 k_6 k_7 k_9 k_{11} k_{12} k_{13} + k_3 k_4 k_6 k_7 k_9 k_{11} k_{12} k_{14}
\end{aligned}$$

$$\begin{aligned}
& -k_3 k_4 k_6 k_7 k_9 k_{12}^2 k_{13} + k_3 k_4 k_6 k_7 k_9 k_{12}^2 k_{14} + k_3 k_4 k_7^2 k_8^2 k_{13} k_{14} + k_3 k_4 k_7^2 k_8^2 k_{14}^2 \\
& + 2 k_3 k_4 k_7^2 k_8 k_{12} k_{13} k_{14} + 2 k_3 k_4 k_7^2 k_8 k_{12} k_{14}^2 + k_3 k_4 k_7^2 k_{12}^2 k_{13} k_{14} + k_3 k_4 k_7^2 k_{12}^2 k_{14}^2 \\
& + k_3 k_4 k_7 k_8^2 k_{11} k_{13} k_{14} + k_3 k_4 k_7 k_8^2 k_{11} k_{14}^2 + k_3 k_4 k_7 k_8 k_{11} k_{12} k_{13} k_{14} \\
& + k_3 k_4 k_7 k_8 k_{11} k_{12} k_{14}^2 + k_4 k_6^2 k_7^2 k_9 k_{12} k_{13} + k_4 k_6^2 k_7^2 k_{12}^2 k_{13} + k_4 k_6^2 k_7 k_9 k_{11} k_{12} k_{13} \\
& + k_4 k_6^2 k_7 k_9 k_{12}^2 k_{13} + k_4 k_6 k_7^2 k_8 k_{12} k_{13}^2 + k_4 k_6 k_7^2 k_8 k_{12} k_{13} k_{14} + k_4 k_6 k_7^2 k_{12}^2 k_{13}^2 \\
& + k_4 k_6 k_7^2 k_{12}^2 k_{13} k_{14} + k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13}^2 + k_4 k_6 k_7 k_8 k_{11} k_{12} k_{13} k_{14})
\end{aligned}$$

>

Is it the same as the other model extend8-mutant1 that we just need to find the parameters to make this term positive? We need to go back to the literature to understand the mathematical proof.

Now I try to plug in some arbitrary parameter to test:

NB: the following parameter set I chose is based on the thermodynamic balance of allosteric regulations,

which is $\frac{k_1}{k_2} \cdot \frac{k_{13}}{k_{14}} = \frac{k_4}{k_5} \cdot \frac{k_9}{k_{10}}$

$params := \{k_1 = 0.01, k_2 = 1, k_3 = 1, k_4 = 0.1, k_5 = 0.001, k_6 = 100, k_7 = 100, k_8 = 0.1, k_9 = 0.001, k_{10} = 0.1, k_{11} = 1, k_{12} = 0.001, k_{13} = 1, k_{14} = 0.01\} :$

> $params := \{k_1 = 0.01, k_2 = 1, k_3 = 1, k_4 = 0.1, k_5 = 0.001, k_6 = 100, k_7 = 100, k_8 = 0.1, k_9 = 0.001, k_{10} = 0.1, k_{11} = 1, k_{12} = 0.001, k_{13} = 1, k_{14} = 0.01\} :$

> $subs(params, term)$

10.00086822 (11)

> $finalPol2 := subs(params, finalPol)$

$finalPol2 := 10.00086822 x_4 x_5^2 - 12.61185108 x_4 x_5 - 319.4016502 x_4 - 104.2503549 x_5^4$ (12)

$- 415.6583015 x_5^3 - 3516.403236 x_5^2 - 4089.180988 x_5$

> $finalPol2 := collect(%, x_4)$

$finalPol2 := (10.00086822 x_5^2 - 12.61185108 x_5 - 319.4016502) x_4 - 104.2503549 x_5^4$ (13)

$- 415.6583015 x_5^3 - 3516.403236 x_5^2 - 4089.180988 x_5$

> $x5 := 10 :$

> $subs(x5 = x5, finalPol2)$

$554.5666610 x_4 - 1.850693984 10^6$ (14)

> $x4 := solve(%, x_4)$

$x4 := 3337.189402$ (15)

$$\begin{aligned} &> \text{subs}(\text{params}, x_4 = x4, x_5 = x5, \text{finalPol}) \\ &\quad -0.0005 \end{aligned} \quad (16)$$

Now we need to calculate the steady states from parameter set and x_4 and x_5 .

$$\begin{aligned} &> \text{solution2} := \text{subs}(\text{params}, x_4 = x4, x_5 = x5, \text{solution}) \\ \text{solution2} &:= [[x_2 = 0.3545217128, x_3 = 304.2691415, x_1 = 973.7484063, x_6 = 32.46950359, x_7 \\ &\quad = 3.367016080]] \end{aligned} \quad (17)$$

$$\begin{aligned} &> B_1 := \text{subs}(\text{solution2}[1], x_4 = x4, x_5 = x5, x_1 + x_2 + x_3 + x_4 + x_6 + x_7) \\ &\quad B_1 := 4651.397992 \end{aligned} \quad (18)$$

$$\begin{aligned} &> B_2 := \text{subs}(\text{solution2}[1], x_4 = x4, x_5 = x5, x_5 + x_6 + x_7) \\ &\quad B_2 := 45.83651967 \end{aligned} \quad (19)$$

$$\begin{aligned} &> \text{subs}(\text{params}, T_1 = B_1, T_2 = B_2, \text{subsEqs}) \\ &[-101 x_2 + 0.001 x_4 + x_6, -0.1 x_3 x_5 + 0.001 x_1 - 0.1 x_3 + 0.1 x_4 + 0.001 x_7, -0.01 x_1 x_5 \\ &\quad - 0.001 x_1 + 100 x_2 + 0.1 x_3 + x_6, 0.01 x_1 x_5 - 3 x_6 + 0.01 x_7, 0.1 x_3 x_5 + x_6 \\ &\quad - 100.011 x_7, x_1 + x_2 + x_3 + x_4 + x_6 + x_7 - 4651.397992, x_5 + x_6 + x_7 - 45.83651967] \end{aligned} \quad (20)$$

$$\begin{aligned} &> \text{solutionSS} := \text{solve}(\%) \\ \text{solutionSS} &:= \{x_1 = 609.7110014, x_2 = 0.3162435851, x_3 = 253.1618251, x_4 = 3756.233920, x_5 \\ &\quad = 13.86151767, x_6 = 28.18436818, x_7 = 3.790633823\}, \{x_1 = 973.6731642, x_2 \\ &\quad = 0.3545160537, x_3 = 304.2609276, x_4 = 3337.273435, x_5 = 10.00057068, x_6 \\ &\quad = 32.46884798, x_7 = 3.367101009\}, \{x_1 = 973.8236467, x_2 = 0.3545273712, x_3 \\ &\quad = 304.2773545, x_4 = 3337.105373, x_5 = 9.999429401, x_6 = 32.47015912, x_7 \\ &\quad = 3.366931153\} \end{aligned} \quad (21)$$

we calculate the stability of those two steady states:

$$\begin{aligned} &> \text{ssJ} := \text{VectorCalculus}[\text{Jacobian}](\text{ssEqs}, [\text{seq}(x_i, i = 1..7)]) \\ \text{ssJ} &:= [[-k_1 x_5 - k_9, k_7, k_{10}, 0, -k_1 x_1, k_2, 0], \\ &\quad [0, -k_7 - k_{11}, 0, k_{12}, 0, k_3, 0], \\ &\quad [k_9, 0, -k_4 x_5 - k_{10}, k_8, -k_4 x_3, 0, k_5], \\ &\quad [0, k_{11}, 0, -k_8 - k_{12}, 0, 0, k_6], \\ &\quad [-k_1 x_5, 0, -k_4 x_5, 0, -k_1 x_1 - k_4 x_3, k_2 + k_3, k_5 + k_6], \\ &\quad [k_1 x_5, 0, 0, 0, k_1 x_1, -k_2 - k_3 - k_{13}, k_{14}]] \end{aligned} \quad (22)$$

$$[0, 0, k_4 x_5, 0, k_4 x_3, k_{13}, -k_5 - k_6 - k_{14}]]$$

> subs(params, solutionSS[1], ssJ); Eigenvalues(%)

$$\begin{bmatrix} -0.1396151767 & 100 & 0.1 & 0 & -6.097110014 & 1 & 0 \\ 0 & -101 & 0 & 0.001 & 0 & 1 & 0 \\ 0.001 & 0 & -1.486151767 & 0.1 & -25.31618251 & 0 & 0.001 \\ 0 & 1 & 0 & -0.101 & 0 & 0 & 100 \\ -0.1386151767 & 0 & -1.386151767 & 0 & -31.41329252 & 2 & 100.001 \\ 0.1386151767 & 0 & 0 & 0 & 6.097110014 & -3 & 0.01 \\ 0 & 0 & 1.386151767 & 0 & 25.31618251 & 1 & -100.011 \end{bmatrix}$$

$$\begin{bmatrix} -126.878760839717 + 0. I \\ -100.998605837052 + 0. I \\ -7.73117072279900 + 0. I \\ -1.54152415153697 + 0. I \\ -0.000997982251059403 + 0. I \\ -1.50173523927320 \cdot 10^{-15} + 0. I \\ 6.96552727804085 \cdot 10^{-8} + 0. I \end{bmatrix}$$

(23)

> subs(params, solutionSS[2], ssJ); Eigenvalues(%)

$$\begin{bmatrix} -0.1010057068 & 100 & 0.1 & 0 & -9.736731642 & 1 & 0 \\ 0 & -101 & 0 & 0.001 & 0 & 1 & 0 \\ 0.001 & 0 & -1.100057068 & 0.1 & -30.42609276 & 0 & 0.001 \\ 0 & 1 & 0 & -0.101 & 0 & 0 & 100 \\ -0.1000057068 & 0 & -1.000057068 & 0 & -40.16282440 & 2 & 100.001 \\ 0.1000057068 & 0 & 0 & 0 & 9.736731642 & -3 & 0.01 \\ 0 & 0 & 1.000057068 & 0 & 30.42609276 & 1 & -100.011 \end{bmatrix}$$

$$\begin{bmatrix} -133.066287572301 + 0. I \\ -100.998997297821 + 0. I \\ -10.2441063305620 + 0. I \\ -1.16649625501007 + 0. I \\ 0.00000461557922948924 + 0. I \\ -0.00000433468584816561 + 0. I \\ -1.06447014748272 \cdot 10^{-15} + 0. I \end{bmatrix}$$

(24)

> subs(params, solutionSS[3], ssJ); Eigenvalues(%)

$$\begin{bmatrix} -0.1009942940 & 100 & 0.1 & 0 & -9.738236467 & 1 & 0 \\ 0 & -101 & 0 & 0.001 & 0 & 1 & 0 \\ 0.001 & 0 & -1.099942940 & 0.1 & -30.42773545 & 0 & 0.001 \\ 0 & 1 & 0 & -0.101 & 0 & 0 & 100 \\ -0.09999429401 & 0 & -0.9999429401 & 0 & -40.16597192 & 2 & 100.001 \\ 0.09999429401 & 0 & 0 & 0 & 9.738236467 & -3 & 0.01 \\ 0 & 0 & 0.9999429401 & 0 & 30.42773545 & 1 & -100.011 \end{bmatrix}$$

$$\begin{bmatrix} -133.068402840814 + 0. I \\ -100.998997413489 + 0. I \\ -10.2451228475621 + 0. I \\ -1.16638577095404 + 0. I \\ -1.40594619852192 \cdot 10^{-7} + 0.00000545661044838133 I \\ -1.40594619852192 \cdot 10^{-7} - 0.00000545661044838133 I \\ 8.70977221979375 \cdot 10^{-12} + 0. I \end{bmatrix}$$

(25)

