## Numeical trial

```
Clear["Global`*"];
des = {x[1]'[t], x[2]'[t], x[3]'[t], x[4]'[t],}
             x[5]'[t], x[6]'[t], x[7]'[t], x[8]'[t], x[9]'[t] ==
          \{-k[1] \times [1] [t] \times [3] [t] + k[2] \times [5] [t] + k[3] \times [5] [t] - k[7] \times [1] [t] \times [7] [t] + k[7] [t
                k[8] x[8][t], -k[4] x[2][t] x[4][t] + k[5] x[6][t] + k[6] x[6][t] -
                k[9] \times [2][t] \times [7][t] + k[10] \times [9][t], -k[1] \times [1][t] \times [3][t] + k[2] \times [5][t] +
                k[6] \times [6] [t], -k[4] \times [2] [t] \times [4] [t] + k[3] \times [5] [t] + k[5] \times [6] [t],
             k[1] x[1][t] x[3][t] - k[2] x[5][t] - k[3] x[5][t],
             k[4] \times [2] [t] \times [4] [t] - k[5] \times [6] [t] - k[6] \times [6] [t]
             -k[7] \times [1] [t] \times [7] [t] -k[9] \times [2] [t] \times [7] [t] +k[8] \times [8] [t] +k[10] \times [9] [t]
             k[7] \times [1][t] \times [7][t] - k[8] \times [8][t], k[9] \times [2][t] \times [7][t] - k[10] \times [9][t];
init = {T[1], T[2], T[3], 0, 0, 0, T[4], 0, 0};
vars = Array[x, 9];
dvars = Thread[Derivative[1][vars]];
Block[{k, T, ssthreshold}, k[n_] := k[n] = (SeedRandom[n];
                RandomReal[]);
       T[n_] := T[n] = (SeedRandom[n+10]; RandomReal[]);
       ssthreshold = 1.*^-4;
       (*Print[des];*)(*to see the ODE*)
       {sol} = NDSolve[{des, Through[vars[0]] == init, With[{df = Through[dvars[t]]}},
                    WhenEvent[Norm[df] < ssthreshold, x[7][t] \rightarrow x[7][t] + 0.1]},
             vars, \{t, 0, 200\}, MaxSteps \rightarrow 100000];
Plot @@ {Through[vars[t]] /. sol,
       Flatten@\{t, x[1]["Domain"] /. sol\}, PlotLegends <math>\rightarrow Automatic}
0.4
0.3
0.2
0.1
                                                                     100
                                                                                                      150
```

## Analytical solution trial

```
Solve[Table[0, \{i, Length[des[[1]]]\}] = des[[2]],
 Table[x[i][t], {i, Length[des[[1]]]}]]
```

Solve:svars: Equationsmaynotgivesolutionsforall "solve" variables>>>

$$\begin{split} & \left\{ \left\{ x[3][t] \rightarrow \frac{(k[2] + k[3]) \; x[5][t]}{k[1] \; x[1][t]}, \; x[4][t] \rightarrow \frac{k[3] \; (k[5] + k[6]) \; x[5][t]}{k[4] \; k[6] \; x[2][t]}, \right. \\ & \left. x[6][t] \rightarrow \frac{k[3] \; x[5][t]}{k[6]}, \; x[8][t] \rightarrow \frac{k[7] \; x[1][t] \; x[7][t]}{k[8]}, \right. \\ & \left. x[9][t] \rightarrow \frac{k[9] \; x[2][t] \; x[7][t]}{k[10]} \right\}, \; \left\{ x[1][t] \rightarrow 0, \; x[4][t] \rightarrow 0, \right. \\ & \left. x[5][t] \rightarrow 0, \; x[6][t] \rightarrow 0, \; x[8][t] \rightarrow 0, \; x[9][t] \rightarrow \frac{k[9] \; x[2][t] \; x[7][t]}{k[10]} \right\}, \\ & \left\{ x[1][t] \rightarrow 0, \; x[2][t] \rightarrow 0, \; x[5][t] \rightarrow 0, \; x[6][t] \rightarrow 0, \; x[8][t] \rightarrow 0, \; x[9][t] \rightarrow 0 \right\}, \\ & \left\{ x[2][t] \rightarrow 0, \; x[3][t] \rightarrow 0, \; x[5][t] \rightarrow 0, \; x[6][t] \rightarrow 0, \\ & \left. x[8][t] \rightarrow \frac{k[7] \; x[1][t] \; x[7][t]}{k[8]}, \; x[9][t] \rightarrow 0 \right\} \right\} \end{split}$$

Here we have substitution:

$$\left\{ \frac{k[2] + k[3]}{k[1]} \to km[1], \frac{k[5] + k[6]}{k[4]} \to km[2], \\ \frac{k[3]}{k[6]} \to kcr, \frac{k[7]}{k[8]} \to kd[1], \frac{k[9]}{k[10]} \to kd[2] \right\}$$
 solution =  $\left\{ \mathbf{x}[3] \to \frac{km[1] \ \mathbf{x}[5]}{\mathbf{x}[1]}, \mathbf{x}[4] \to \frac{kcr * km[2] \ \mathbf{x}[5]}{\mathbf{x}[2]}, \\ \mathbf{x}[6] \to kcr \ \mathbf{x}[5], \mathbf{x}[8] \to kd[1] \ \mathbf{x}[1] \ \mathbf{x}[7], \mathbf{x}[9] \to kd[2] \ \mathbf{x}[2] \ \mathbf{x}[7] \right\}$   $\left\{ \mathbf{x}[3] \to \frac{km[1] \ \mathbf{x}[5]}{\mathbf{x}[1]}, \mathbf{x}[4] \to \frac{kcr \ km[2] \ \mathbf{x}[5]}{\mathbf{x}[2]}, \\ \mathbf{x}[6] \to kcr \ \mathbf{x}[5], \mathbf{x}[8] \to kd[1] \ \mathbf{x}[1] \ \mathbf{x}[7], \mathbf{x}[9] \to kd[2] \ \mathbf{x}[2] \ \mathbf{x}[7] \right\}$  Here we have 
$$\left\{ T[1] = \mathbf{x}[1] + \mathbf{x}[5] + \mathbf{x}[8], T[2] = \mathbf{x}[2] + \mathbf{x}[6] + \mathbf{x}[9], \\ T[3] = \mathbf{x}[3] + \mathbf{x}[4] + \mathbf{x}[5] + \mathbf{x}[6], T[4] = \mathbf{x}[7] + \mathbf{x}[8] + \mathbf{x}[9] \right\}$$

## Continue

```
t4 = \left\{T[4] = x[7] + \frac{kd[2] \ km[2] \ T[2] \ x[7]}{km[2] + x[4] + kd[2] \ km[2] \ x[7]} - \frac{kd[2] \ km[2] \ x[7]}{km[2] + x[4] + kd[2] \ km[2] \ x[7]} - \frac{kd[2] \ km[2] \ x[7]}{km[2] + x[4] + kd[2] \ km[2] \ x[7]} - \frac{kd[2] \ km[2] \ x[7]}{km[2] + x[4] + kd[2] \ km[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ km[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ km[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + x[4] + kd[2] \ x[7]} - \frac{kd[2] \ x[7]}{km[2] + kd[2] + 
                                     (kd[1] \times [7] (-km[2] \times [1] - X[1] \times [4] + kcr \times [2] \times [4] - kd[2] \times [2] \times [1] \times [7]))
                                             ((1+kd[1]x[7])(km[2]+x[4]+kd[2]km[2]x[7]))
 \left\{ T[4] = x[7] + \frac{kd[2] \ km[2] \ T[2] \ x[7]}{km[2] + x[4] + kd[2] \ km[2] \ x[7]} \right\}
                             (kd[1] x[7] (-km[2] T[1] - T[1] x[4] + kcr T[2] x[4] - kd[2] km[2] T[1] x[7]))
                                    ((1+kd[1]x[7])(km[2]+x[4]+kd[2]km[2]x[7]))
```

```
t42 = Collect[ExpandAll[{((1 + kd[1] x[7]) (km[2] + x[4] + kd[2] km[2] x[7])) *}
                                        (km[2] + x[4] + kd[2] km[2] x[7]) *T[4] ==
                                  ((1+kd[1]x[7])(km[2]+x[4]+kd[2]km[2]x[7]))*
                                              (km[2] + x[4] + kd[2] km[2] x[7]) * x[7] +
                                       ((1 + kd[1] x[7]) (km[2] + x[4] + kd[2] km[2] x[7])) * kd[2] km[2] T[2] x[7] -
                                       ((km[2] + x[4] + kd[2] km[2] x[7]) * kd[1] x[7] (-km[2] T[1] - T[1] x[4] +
                                                               kcr T[2] x[4] - kd[2] km[2] T[1] x[7]))}, {x[4], x[7]}]
 \left\{km[2]^{2}T[4] + \left(kd[1]km[2]^{2}T[4] + 2kd[2]km[2]^{2}T[4]\right)x[7] + \right\}
                     (2 kd[1] kd[2] km[2]^2 T[4] + kd[2]^2 km[2]^2 T[4]) x[7]^2 +
                   kd[1] \ kd[2]^2 \ km[2]^2 \ T[4] \ x[7]^3 + x[4]^2 \ (T[4] + kd[1] \ T[4] \ x[7]) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2]^2 \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2] \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2] \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2] \right) + x[4] \ \left(2 \ km[2] \ T[4] + kd[2] \right) + 
                                       (2 kd[1] km[2] T[4] + 2 kd[2] km[2] T[4]) x[7] + 2 kd[1] kd[2] km[2] T[4] x[7]^{2} =
              (km[2]^2 + kd[1] km[2]^2 T[1] + kd[2] km[2]^2 T[2]) x[7] +
                     (kd[1] km[2]^2 + 2 kd[2] km[2]^2 + 2 kd[1] kd[2] km[2]^2 T[1] +
                                      kd[1] kd[2] km[2]^2 T[2] + kd[2]^2 km[2]^2 T[2]) x[7]^2 +
                     (2 kd[1] kd[2] km[2]^2 + kd[2]^2 km[2]^2 + kd[1] kd[2]^2 km[2]^2 T[1] +
                                       kd[1] kd[2]^2 km[2]^2 T[2]) x[7]^3 + kd[1] kd[2]^2 km[2]^2 x[7]^4 +
                   x[4]^{2} ((1+kd[1] T[1] - kcr kd[1] T[2]) x[7] + kd[1] x[7]^{2}) +
                   x[4] (2 km[2] + 2 kd[1] km[2] T[1] - kcr kd[1] km[2] T[2] + kd[2] km[2] T[2]) x[7] +
                                       (2 \ kd[1] \ km[2] + 2 \ kd[2] \ km[2] + 2 \ kd[1] \ kd[2] \ km[2] \ T[1] + kd[1] \ kd[2] \ km[2]
                                                               T[2] - kcr kd[1] kd[2] km[2] T[2]) x[7]^{2} + 2 kd[1] kd[2] km[2] x[7]^{3}
Collect \left[ km[2]^2 T[4] + \left( kd[1] km[2]^2 T[4] + 2 kd[2] km[2]^2 T[4] \right) x[7] + \left( kd[2] km[2]^2 T[4] \right) \right]
              (2 kd[1] kd[2] km[2]^2 T[4] + kd[2]^2 km[2]^2 T[4]) x[7]^2 +
             kd[1] kd[2]^2 km[2]^2 T[4] x[7]^3 + x[4]^2 (T[4] + kd[1] T[4] x[7]) + x[4] (2 km[2] T[4] + kd[1] x[7]) + x[4] (2 km[2] x[7]) + x[4] (2 km[2]
                                  (2 kd[1] km[2] T[4] + 2 kd[2] km[2] T[4]) x[7] + 2 kd[1] kd[2] km[2] T[4] x[7]^{2} -
              (km[2]^2 + kd[1] km[2]^2 T[1] + kd[2] km[2]^2 T[2]) x[7] +
                           (kd[1] km[2]^2 + 2 kd[2] km[2]^2 + 2 kd[1] kd[2] km[2]^2 T[1] +
                                           kd[1] kd[2] km[2]^2 T[2] + kd[2]^2 km[2]^2 T[2]) x[7]^2 +
                           (2 kd[1] kd[2] km[2]^2 + kd[2]^2 km[2]^2 + kd[1] kd[2]^2 km[2]^2 T[1] +
                                            kd[1] kd[2]^2 km[2]^2 T[2] x[7]^3 + kd[1] kd[2]^2 km[2]^2 x[7]^4 +
                         x[4]^{2}((1+kd[1]T[1]-kcrkd[1]T[2])x[7]+kd[1]x[7]^{2})+
                         x[4] ((2 km[2] + 2 kd[1] km[2] T[1] - kcr kd[1] km[2] T[2] + kd[2] km[2] T[2]) x[7] +
                                              (2 kd[1] km[2] + 2 kd[2] km[2] + 2 kd[1] kd[2] km[2] T[1] +
                                                               kd[1] kd[2] km[2] T[2] - kcr kd[1] kd[2] km[2] T[2])
                                                   x[7]^2 + 2 kd[1] kd[2] km[2] x[7]^3), {x[4], x[7]}
km[2]^2T[4] + (-km[2]^2 - kd[1] km[2]^2T[1] -
                         kd[2] km[2]^2 T[2] + kd[1] km[2]^2 T[4] + 2 kd[2] km[2]^2 T[4]) x[7] +
       (-kd[1] km[2]^2 - 2 kd[2] km[2]^2 - 2 kd[1] kd[2] km[2]^2 T[1] - kd[1] kd[2] km[2]^2 T[2] - kd[2] km[2] km[2]
                         kd[2]^2 km[2]^2 T[2] + 2 kd[1] kd[2] km[2]^2 T[4] + kd[2]^2 km[2]^2 T[4]) x[7]^2 +
        (-2 \text{ kd}[1] \text{ kd}[2] \text{ km}[2]^2 - \text{kd}[2]^2 \text{ km}[2]^2 - \text{kd}[1] \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] - \text{kd}[1] \text{ kd}[2]^2
                               km[2]^2 T[2] + kd[1] kd[2]^2 km[2]^2 T[4] ) x[7]^3 - kd[1] kd[2]^2 km[2]^2 x[7]^4 + kd[1] kd[2]^2 km[2]^2 x[7]^4 + kd[1] kd[2]^2 km[2]^2 km[
       x[4]^{2}(T[4] + (-1 - kd[1] T[1] + kcr kd[1] T[2] + kd[1] T[4]) x[7] - kd[1] x[7]^{2} + kd[1] T[4] + kd[1] + kd
       x[4] (2 km[2] T[4] + (-2 km[2] - 2 kd[1] km[2] T[1] + kcr kd[1] km[2] T[2] - kcr kd[1] km[2] tcr kd[1] km[2] km[2] tcr kd[1] km[2] km[2] tcr kd[1] km[2] km[
                                            kd[2] km[2] T[2] + 2 kd[1] km[2] T[4] + 2 kd[2] km[2] T[4]) x[7] +
                           (-2 kd[1] km[2] - 2 kd[2] km[2] - 2 kd[1] kd[2] km[2] T[1] -
                                            kd[1] kd[2] km[2] T[2] + kcr kd[1] kd[2] km[2] T[2] +
                                             2 \text{ kd}[1] \text{ kd}[2] \text{ km}[2] \text{ T}[4]) \text{ x}[7]^{2} - 2 \text{ kd}[1] \text{ kd}[2] \text{ km}[2] \text{ x}[7]^{3}
```

```
Simplify \left[ km[2]^2 T[4] + \left( -km[2]^2 - kd[1] km[2]^2 T[1] - km[2]^2 \right] \right]
                                kd[2] km[2]^2 T[2] + kd[1] km[2]^2 T[4] + 2 kd[2] km[2]^2 T[4]) x[7] +
              (-kd[1] km[2]^2 - 2 kd[2] km[2]^2 - 2 kd[1] kd[2] km[2]^2 T[1] - kd[1] kd[2] km[2]^2 T[2] - kd[2] km[2] km[2]
                                kd[2]^2 km[2]^2 T[2] + 2 kd[1] kd[2] km[2]^2 T[4] + kd[2]^2 km[2]^2 T[4]) x[7]^2 +
              (-2 \text{ kd}[1] \text{ kd}[2] \text{ km}[2]^2 - \text{kd}[2]^2 \text{ km}[2]^2 - \text{kd}[1] \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] - \text{kd}[1] \text{ kd}[2]^2
                                      km[2]^2T[2] + kd[1] kd[2]^2 km[2]^2T[4]) x[7]^3 - kd[1] kd[2]^2 km[2]^2 x[7]^4 +
             x[4]^{2}(T[4] + (-1 - kd[1] T[1] + kcr kd[1] T[2] + kd[1] T[4]) x[7] - kd[1] x[7]^{2} + kd[1] T[4] + (-1 - kd[1] T[1] + kcr kd[1] T[2] + kd[1] T[4]) x[7] - kd[1] x[7]^{2} + kd[1] T[4] + (-1 - kd[1] T[1] + kcr kd[1] T[2] + kd[1] T[4]) x[7] - kd[1] x[7]^{2} + kd[1] T[4] + (-1 - kd[1] T[4] + kcr kd[1] T[4] + kcr kd[1] T[4] + kd[1] + kd[
             x[4] (2 km[2] T[4] + (-2 km[2] - 2 kd[1] km[2] T[1] + kcr kd[1] km[2] T[2] -
                                                   kd[2] km[2] T[2] + 2 kd[1] km[2] T[4] + 2 kd[2] km[2] T[4]) x[7] +
                                 (-2 kd[1] km[2] - 2 kd[2] km[2] - 2 kd[1] kd[2] km[2] T[1] -
                                                   kd[1] kd[2] km[2] T[2] + kcr kd[1] kd[2] km[2] T[2] +
                                                   2 \text{ kd}[1] \text{ kd}[2] \text{ km}[2] \text{ T}[4]) x[7]^{2} - 2 \text{ kd}[1] \text{ kd}[2] \text{ km}[2] x[7]^{3}
-(km[2] + x[4] + kd[2] km[2] x[7])
        (x[4] (-T[4] (1+kd[1] x[7]) + x[7] (1+kd[1] (T[1]-kcr T[2]+x[7]))) +
                   km[2] \ (-T[4] \ (1+kd[1] \ x[7]) \ (1+kd[2] \ x[7]) + x[7] \ (1+kd[2] \ (T[2] + x[7]) + x[7]) + x[7] \ (1+kd[2] \ (T[2] + x[7]) + x[7]) + x[7] \ (1+kd[2] \ (T[2] + x[7]) + x[7]) + x[7] \ (1+kd[2] \ (T[2] + x[7]) + x[7]) + x[7] \ (1+kd[2] \ (T[2] + x[7]) + x[7]) + x[7] \ (T[2] + x[7]) + x[7] \ (
                                                          kd[1] (T[1] (1 + kd[2] x[7]) + x[7] (1 + kd[2] (T[2] + x[7]))))))
Full Simplify[x[4] (-T[4] (1+kd[1] x[7]) + x[7] (1+kd[1] (T[1]-kcr T[2]+x[7]))) + x[7] (T[1]-kcr T[2]+x[7])) + x[7] (T[1]-kcr T[2]+x[7]) + x[7]
             km[2] (-T[4] (1 + kd[1] x[7]) (1 + kd[2] x[7]) + x[7] (1 + kd[2] (T[2] + x[7]) + x[7] (1 + kd[2] (T[2] + x[7]) + x[7])
                                                   kd[1] (T[1] (1 + kd[2] x[7]) + x[7] (1 + kd[2] (T[2] + x[7]))))))
x[4] (-T[4] (1+kd[1] x[7]) + x[7] (1+kd[1] (T[1]-kcr T[2]+x[7]))) +
      km[2] (-T[4] (1 + kd[1] x[7]) (1 + kd[2] x[7]) + x[7] (1 + kd[2] (T[2] + x[7]) + x[7])
                                            kd[1] (T[1] + x[7] + kd[2] (T[1] + T[2]) x[7] + kd[2] x[7]^{2}))
                                                                                                                                                  T[2] x[4]
t3 = \{T[3] = x[4] + -\frac{1}{k}\}
                                                                                                    km[2] + x[4] + kd[2] km[2] x[7]
                                                                         kcrT[2]x[4]
                                                                                                                                                                           \frac{1}{1-x^2} - (kcr km[1] T[2] x[4] (1+kd[1] x[7])) /
                           km[2] + x[4] + kd[2] km[2] x[7]
                                 (-km[2] T[1] - T[1] x[4] + kcr T[2] x[4] - kd[2] km[2] T[1] x[7])
                                                                              km[2] + x[4] + kd[2] km[2] x[7]
                                                                  kcrT[2]x[4]
                                                                                                                                                                 - (kcr km[1] T[2] x[4] (1+kd[1] x[7])) /
                     km[2] + x[4] + kd[2] km[2] x[7]
                           \left.\left(-\,km\,[\,2\,]\,\,T\,[\,1\,]\,-T\,[\,1\,]\,\,x\,[\,4\,]\,+\,kcr\,T\,[\,2\,]\,\,x\,[\,4\,]\,-\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,1\,]\,\,x\,[\,7\,]\,\right)\,\right\}
```

```
t32 = Collect[
         ExpandA11[{(km[2] + x[4] + kd[2] km[2] x[7]) * (km[2] + x[4] + kd[2] km[2] x[7]) *}
                            (-km[2]T[1]-T[1]x[4]+kcrT[2]x[4]-kd[2]km[2]T[1]x[7])*T[3] ==
                        (-km[2]T[1]-T[1]x[4]+kcrT[2]x[4]-kd[2]km[2]T[1]x[7])*
                                 (km[2] + x[4] + kd[2] km[2] x[7]) * (km[2] + x[4] + kd[2] km[2] x[7]) * x[4] +
                            (-km[2]T[1]-T[1]x[4]+kcrT[2]x[4]-kd[2]km[2]T[1]x[7])*
                                (km[2] + x[4] + kd[2] km[2] x[7]) * T[2] x[4] +
                            (-km[2]T[1]-T[1]x[4]+kcrT[2]x[4]-kd[2]km[2]T[1]x[7])*
                                (km[2] + x[4] + kd[2] km[2] x[7]) * kcr T[2] x[4] -
                            (km[2] + x[4] + kd[2] km[2] x[7]) * (km[2] + x[4] + kd[2] km[2] x[7]) *
                              kcr km[1] T[2] x[4] (1+kd[1] x[7]) \}], {x[4], x[7]}]
 \left\{-km[2]^3T[1]T[3] + (-T[1]T[3] + kcrT[2]T[3])x[4]^3 - \right\}
             3 \text{ kd}[2] \text{ km}[2]^3 \text{ T}[1] \text{ T}[3] \text{ x}[7] - 3 \text{ kd}[2]^2 \text{ km}[2]^3 \text{ T}[1] \text{ T}[3] \text{ x}[7]^2 -
             kd[2]^{3}\;km[2]^{3}\;T[1]\;T[3]\;x[7]^{3}\;+\;x[4]^{2}\;\left(-\,3\;km[2]\;T[1]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;+\;2\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;T[3]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[2]\;kcr\;km[
                            (-3\;kd[2]\;km[2]\;T[1]\;T[3]\;+2\;kcr\;kd[2]\;km[2]\;T[2]\;T[3])\;x[7]\,)\;+
             x[4] \left(-3 \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + \text{kcr km}[2]^2 \text{ T}[2] \text{ T}[3] + \right]
                            (-6 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kcr kd}[2] \text{ km}[2]^2 \text{ T}[2] \text{ T}[3]) \text{ x}[7] +
                             (-3 \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + \text{kcr} \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[2] \text{ T}[3]) \text{ x}[7]^2) =
          (-T[1] + kcr T[2]) x[4]^4 + x[4]^3 (-3 km[2] T[1] - kcr km[1] T[2] +
                           2 \ker km[2] T[2] - T[1] T[2] - \ker T[1] T[2] + \ker T[2]^2 + \ker^2 T[2]^2 +
                            (-3 \text{ kd}[2] \text{ km}[2] \text{ T}[1] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ T}[2] + 2 \text{ kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2]) \text{ x}[7]) +
             x[4]^{2}(-3 \text{ km}[2]^{2} \text{ T}[1] - 2 \text{ kcr km}[1] \text{ km}[2] \text{ T}[2] + \text{kcr km}[2]^{2} \text{ T}[2] -
                           2\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;+\;kcr\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]\;T[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;+\;kcr^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;km[\,2\,
                            (-6 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] - 2 \text{ kcr kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] - 2 \text{ kcr kd}[2] \text{ km}[1]
                                             km[2] T[2] + 2 kcr kd[2] km[2]^2 T[2] - 2 kd[2] km[2] T[1] T[2] -
                                        2 \text{ kcr kd}[2] \text{ km}[2] \text{ T}[1] \text{ T}[2] + \text{ kcr kd}[2] \text{ km}[2] \text{ T}[2]^2 + \text{ kcr}^2 \text{ kd}[2] \text{ km}[2] \text{ T}[2]^2
                               x[7] + (-3 \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] - 2 \text{ kcr kd}[1] \text{ kd}[2] \text{ km}[1] \text{ km}[2] \text{ T}[2] +
                                        kcr kd[2]^2 km[2]^2 T[2]) x[7]^2 +
             x[4] (-km[2]^3 T[1] - kcr km[1] km[2]^2 T[2] - km[2]^2 T[1] T[2] - kcr km[2]^2 T[1] T[2] +
                            (-3 \text{ kd}[2] \text{ km}[2]^3 \text{ T}[1] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] - 2 \text{ kcr} \text{ kd}[2] \text{ km}[1] \text{ km}[2]^2
                                             T[2] - 2 kd[2] km[2]^2 T[1] T[2] - 2 kcr kd[2] km[2]^2 T[1] T[2]) x[7] +
                            (-3 \text{ kd}[2]^2 \text{ km}[2]^3 \text{ T}[1] - 2 \text{ kcr kd}[1] \text{ kd}[2] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] - \text{kcr kd}[2]^2 \text{ km}[1]
                                             km[2]^2T[2] - kd[2]^2km[2]^2T[1]T[2] - kcrkd[2]^2km[2]^2T[1]T[2])x[7]^2 +
                            \left(-kd[2]^3 km[2]^3 T[1] - kcr kd[1] kd[2]^2 km[1] km[2]^2 T[2]\right) x[7]^3
```

```
Collect [-km[2]^3 T[1] T[3] + (-T[1] T[3] + kcr T[2] T[3]) x[4]^3 -
      3 \text{ kd}[2] \text{ km}[2]^3 \text{ T}[1] \text{ T}[3] \text{ x}[7] - 3 \text{ kd}[2]^2 \text{ km}[2]^3 \text{ T}[1] \text{ T}[3] \text{ x}[7]^2 -
      kd[2]^3 km[2]^3 T[1] T[3] x[7]^3 + x[4]^2 (-3 km[2] T[1] T[3] + 2 kcr km[2] T[2] T[3] +
                (-3 kd[2] km[2] T[1] T[3] + 2 kcr kd[2] km[2] T[2] T[3]) x[7]) +
      x[4] \left(-3 \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + \text{kcr km}[2]^2 \text{ T}[2] \text{ T}[3] + \right)
                (-6 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kcr} \text{ kd}[2] \text{ km}[2]^2 \text{ T}[2] \text{ T}[3]) \text{ x}[7] +
                (-3 \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + \text{kcr} \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[2] \text{ T}[3]) \times [7]^2) -
      (-T[1] + kcr T[2]) \times [4]^4 + x[4]^3 (-3 km[2] T[1] - kcr km[1] T[2] +
                     2 \text{ kcr km}[2] \text{ T}[2] - \text{T}[1] \text{ T}[2] - \text{kcr T}[1] \text{ T}[2] + \text{kcr T}[2]^2 + \text{kcr}^2 \text{ T}[2]^2 +
                     (-3 \text{ kd}[2] \text{ km}[2] \text{ T}[1] - \text{ker kd}[1] \text{ km}[1] \text{ T}[2] + 2 \text{ ker kd}[2] \text{ km}[2] \text{ T}[2]) \times [7]) +
            x[4]^{2}(-3 \text{ km}[2]^{2} \text{ T}[1] - 2 \text{ kcr km}[1] \text{ km}[2] \text{ T}[2] + \text{ kcr km}[2]^{2} \text{ T}[2] -
                     2 \text{ km}[2] \text{ T}[1] \text{ T}[2] - 2 \text{ kcr km}[2] \text{ T}[1] \text{ T}[2] + \text{ kcr km}[2] \text{ T}[2]^2 + \text{ kcr}^2 \text{ km}[2] \text{ T}[2]^2 +
                     (-6 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] - 2 \text{ kcr kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] - 2 \text{ kcr kd}[2] \text{ km}[1] \text{ km}[2]
                                 T[2] + 2 kcr kd[2] km[2]^2 T[2] - 2 kd[2] km[2] T[1] T[2] - 2 kcr kd[2]
                                 km[2] T[1] T[2] + kcr kd[2] km[2] T[2]^2 + kcr^2 kd[2] km[2] T[2]^2 x[7] +
                      (-3 \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] - 2 \text{ kcr kd}[1] \text{ kd}[2] \text{ km}[1] \text{ km}[2] \text{ T}[2] +
                              kcr kd[2]^2 km[2]^2 T[2]) x[7]^2) + x[4]
                (-km[2]^3T[1] - kcr km[1] km[2]^2T[2] - km[2]^2T[1]T[2] - kcr km[2]^2T[1]T[2] +
                     (-3 \text{ kd}[2] \text{ km}[2]^3 \text{ T}[1] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] - 2 \text{ kcr} \text{ kd}[2] \text{ km}[1] \text{ km}[2]^2
                                 T[2] - 2 kd[2] km[2]^2 T[1] T[2] - 2 kcr kd[2] km[2]^2 T[1] T[2]) x[7] +
                     (-3 \text{ kd}[2]^2 \text{ km}[2]^3 \text{ T}[1] - 2 \text{ kcr kd}[1] \text{ kd}[2] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] - \text{ kcr kd}[2]^2 \text{ km}[1]
                                 km[2]^2T[2] - kd[2]^2km[2]^2T[1]T[2] - kcrkd[2]^2km[2]^2T[1]T[2])x[7]^2 +
                     (-kd[2]^3 km[2]^3 T[1] - kcr kd[1] kd[2]^2 km[1] km[2]^2 T[2])
                        x[7]^3), \{x[4], x[7]\}
-km[2]^3T[1]T[3] + (T[1] - kcrT[2])x[4]^4 - 3kd[2]km[2]^3T[1]T[3]x[7] - km[2]^3T[1]T[3]x[7]
   3 kd[2]^2 km[2]^3 T[1] T[3] x[7]^2 - kd[2]^3 km[2]^3 T[1] T[3] x[7]^3 +
   x[4]^{3} (3 km[2] T[1] + kcr km[1] T[2] - 2 kcr km[2] T[2] + T[1] T[2] +
            \ker T[1] T[2] - \ker T[2]^2 - \ker^2 T[2]^2 - T[1] T[3] + \ker T[2] T[3] +
             (3 \text{ kd}[2] \text{ km}[2] \text{ T}[1] + \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ T}[2] - 2 \text{ kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2]) \text{ x}[7]) +
  x[4]^{2} (3 km[2]^{2} T[1] + 2 kcr km[1] km[2] T[2] - kcr km[2]^{2} T[2] +
            2 \text{ km}[2] \text{ T}[1] \text{ T}[2] + 2 \text{ kcr km}[2] \text{ T}[1] \text{ T}[2] - \text{kcr km}[2] \text{ T}[2]^2 -
            kcr^{2} km[2] T[2]^{2} - 3 km[2] T[1] T[3] + 2 kcr km[2] T[2] T[3] +
             (6 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] + 2 \text{ kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] + 2 \text{ kcr} \text{ kd}[2] \text{ km}[1] \text{ km}[2] \text{ T}[2] -
                     2\;kcr\;kd[\,2\,]\;km[\,2\,]^{\,2}\;T[\,2\,]\;+\;2\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;-\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;K[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;K[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;km[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;+\;2\;kcr\;kd[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,]\;km[\,2\,
                     kcr kd[2] km[2] T[2]^2 - kcr^2 kd[2] km[2] T[2]^2 - 3 kd[2] km[2] T[1] T[3] +
                     2 \ker kd[2] \ker [2] T[2] T[3] \times [7] + (3 \ker [2]^2 \ker [2]^2 T[1] +
                     2 \text{ kcr kd}[1] \text{ kd}[2] \text{ km}[1] \text{ km}[2] \text{ T}[2] - \text{kcr kd}[2]^2 \text{ km}[2]^2 \text{ T}[2]) \text{ x}[7]^2 +
   x[4] (km[2]^3 T[1] + kcr km[1] km[2]^2 T[2] + km[2]^2 T[1] T[2] +
            kcr km[2]^2 T[1] T[2] - 3 km[2]^2 T[1] T[3] + kcr km[2]^2 T[2] T[3] +
             (3 \text{ kd}[2] \text{ km}[2]^3 \text{ T}[1] + \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] + 2 \text{ kcr} \text{ kd}[2] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] +
                     2 kd[2] km[2]^2 T[1] T[2] + 2 kcr kd[2] km[2]^2 T[1] T[2] -
                     6 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kcr kd}[2] \text{ km}[2]^2 \text{ T}[2] \text{ T}[3]) \text{ x}[7] +
             (3 \text{ kd}[2]^2 \text{ km}[2]^3 \text{ T}[1] + 2 \text{ kcr kd}[1] \text{ kd}[2] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] + \text{ kcr kd}[2]^2
                        km[1] km[2]^2 T[2] + kd[2]^2 km[2]^2 T[1] T[2] + kcr kd[2]^2 km[2]^2 T[1] T[2] -
                     3 \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + \text{kcr} \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[2] \text{ T}[3]) \text{ x}[7]^2 +
             (kd[2]^3 km[2]^3 T[1] + kcr kd[1] kd[2]^2 km[1] km[2]^2 T[2]) x[7]^3
```

```
Simplify \left[ -km[2]^3 T[1] T[3] + (T[1] - kcr T[2]) x[4]^4 - 3 kd[2] km[2]^3 T[1] T[3] x[7] - kcr T[2] + kcr T[2] x[4]^4 - kcr T[2]^4 
         3 \text{ kd}[2]^{2} \text{ km}[2]^{3} \text{ T}[1] \text{ T}[3] \text{ x}[7]^{2} - \text{kd}[2]^{3} \text{ km}[2]^{3} \text{ T}[1] \text{ T}[3] \text{ x}[7]^{3} +
         x[4]^{3} (3 km[2] T[1] + kcr km[1] T[2] - 2 kcr km[2] T[2] + T[1] T[2] +
                       kcr T[1] T[2] - kcr T[2]^2 - kcr^2 T[2]^2 - T[1] T[3] + kcr T[2] T[3] +
                        (3 kd[2] km[2] T[1] + kcr kd[1] km[1] T[2] - 2 kcr kd[2] km[2] T[2]) x[7]) +
         x[4]^{2}(3 km[2]^{2}T[1] + 2 kcr km[1] km[2]T[2] - kcr km[2]^{2}T[2] +
                       2 \text{ km}[2] \text{ T}[1] \text{ T}[2] + 2 \text{ kcr km}[2] \text{ T}[1] \text{ T}[2] - \text{ kcr km}[2] \text{ T}[2]^{2} -
                       kcr^{2} km[2] T[2]^{2} - 3 km[2] T[1] T[3] + 2 kcr km[2] T[2] T[3] +
                        (6 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] + 2 \text{ kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] + 2 \text{ kcr} \text{ kd}[2] \text{ km}[1] \text{ km}[2] \text{ T}[2] -
                                     2 \text{ kcr kd}[2] \text{ km}[2]^2 \text{ T}[2] + 2 \text{ kd}[2] \text{ km}[2] \text{ T}[1] \text{ T}[2] + 2 \text{ kcr kd}[2] \text{ km}[2] \text{ T}[1] \text{ T}[2] -
                                     kcr kd[2] km[2] T[2]^2 - kcr^2 kd[2] km[2] T[2]^2 - 3 kd[2] km[2] T[1] T[3] +
                                     2 kcr kd[2] km[2] T[2] T[3]) x[7] + (3 kd[2]^2 km[2]^2 T[1] +
                                     2 \text{ kcr kd}[1] \text{ kd}[2] \text{ km}[1] \text{ km}[2] \text{ T}[2] - \text{kcr kd}[2]^2 \text{ km}[2]^2 \text{ T}[2]) \times [7]^2 +
         x[4] (km[2]^3 T[1] + kcr km[1] km[2]^2 T[2] + km[2]^2 T[1] T[2] +
                       kcr km[2]^2 T[1] T[2] - 3 km[2]^2 T[1] T[3] + kcr km[2]^2 T[2] T[3] +
                        (3 \text{ kd}[2] \text{ km}[2]^3 \text{ T}[1] + \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] + 2 \text{ kcr} \text{ kd}[2] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] +
                                     2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[2] + 2 \text{ kcr kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[2] -
                                     6 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kcr kd}[2] \text{ km}[2]^2 \text{ T}[2] \text{ T}[3]) \text{ x}[7] +
                        (3 \text{ kd}[2]^2 \text{ km}[2]^3 \text{ T}[1] + 2 \text{ kcr kd}[1] \text{ kd}[2] \text{ km}[1] \text{ km}[2]^2 \text{ T}[2] + \text{ kcr kd}[2]^2
                                         km[1] km[2]^2 T[2] + kd[2]^2 km[2]^2 T[1] T[2] + kcr kd[2]^2 km[2]^2 T[1] T[2] -
                                     3 \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + \text{kcr kd}[2]^2 \text{ km}[2]^2 \text{ T}[2] \text{ T}[3]) \text{ x}[7]^2 +
                        (kd[2]^3 km[2]^3 T[1] + kcr kd[1] kd[2]^2 km[1] km[2]^2 T[2]) x[7]^3)
 (km[2] + x[4] + kd[2] km[2] x[7]) (-km[2]^2 T[1] (T[3] - x[4]) (1 + kd[2] x[7])^2 + kd[2] x[7])^2 + kd[2] x[7] + kd[2] x[2] + kd[2] x
              km[2] x[4] (1+kd[2] x[7]) (T[1] (T[2] -2T[3] +2x[4]) +
                           kcr \, T\, [\, 2\, ] \, \left(km\, [\, 1\, ] \, + T\, [\, 1\, ] \, + T\, [\, 3\, ] \, - x\, [\, 4\, ] \, + kd\, [\, 1\, ] \, km\, [\, 1\, ] \, x\, [\, 7\, ]\, \right)\, + \\
              x[4]^{2}(-kcr^{2}T[2]^{2}+T[1](T[2]-T[3]+x[4])+
                           kcrT[2] (km[1] + T[1] - T[2] + T[3] - x[4] + kd[1] km[1] x[7]))
FullSimplify [-km[2]^2 T[1] (T[3] - x[4]) (1 + kd[2] x[7])^2 +
         km[2] x[4] (1+kd[2] x[7]) (T[1] (T[2]-2T[3]+2x[4]) +
                       kcr T[2] (km[1] + T[1] + T[3] - x[4] + kd[1] km[1] x[7])) +
         x[4]^{2}(-kcr^{2}T[2]^{2}+T[1](T[2]-T[3]+x[4])+
                       kcr T[2] (km[1] + T[1] - T[2] + T[3] - x[4] + kd[1] km[1] x[7])
-km[2]^2T[1](T[3]-x[4])(1+kd[2]x[7])^2+
    km[2] x[4] (1+kd[2] x[7]) (T[1] (T[2] -2T[3] +2x[4]) +
                  kcr \, T \, [\, 2\, ] \  \, (km \, [\, 1\, ] \, + T \, [\, 1\, ] \, + T \, [\, 3\, ] \, - x \, [\, 4\, ] \, + kd \, [\, 1\, ] \, \, km \, [\, 1\, ] \, \, x \, [\, 7\, ]\, )\, ) \, + \\
    x[4]^{2}(-kcr^{2}T[2]^{2}+T[1](T[2]-T[3]+x[4])+
                  kcr T[2] (km[1] + T[1] - T[2] + T[3] - x[4] + kd[1] km[1] x[7])
simpT4 =
     \textbf{Collect} \Big[ \Big\{ \texttt{x[4]} \ (-\texttt{T[4]} \ (1+\texttt{kd[1]} \ \texttt{x[7]}) + \texttt{x[7]} \ (1+\texttt{kd[1]} \ (\texttt{T[1]}-\texttt{kcr} \ \texttt{T[2]}+\texttt{x[7]})) \big) + \\ \\ + (-\texttt{T[4]} \ (-\texttt{T[4]} \ (1+\texttt{kd[1]} \ \texttt{x[7]}) + \texttt{x[7]} \ (1+\texttt{kd[1]} \ (-\texttt{T[4]} \ (-\texttt{T[4]} \ (1+\texttt{kd[1]} \ \texttt{x[7]}))) + \\ \\ + (-\texttt{T[4]} \ (-\texttt{T[4]} \ (1+\texttt{kd[1]} \ \texttt{x[7]}) + \texttt{x[7]} \ (1+\texttt{kd[1]} \ (-\texttt{T[4]} \ (
                       km[2] (-T[4] (1+kd[1] x[7]) (1+kd[2] x[7]) +
                                     x[7] (1+kd[2] (T[2]+x[7])+kd[1] (T[1]+x[7]+
                                                               kd[2](T[1] + T[2]) x[7] + kd[2] x[7]^{2})) = 0, {x[4], x[7]}
 \left\{ -km\left[ \,2\,\right] \,\,T\left[ \,4\,\right] \,\,+\,\right.
               (km[2] + kd[1] km[2] T[1] + kd[2] km[2] T[2] - kd[1] km[2] T[4] - kd[2] km[2] T[4])
                  x[7] + (kd[1] km[2] + kd[2] km[2] + kd[1] kd[2] km[2] (T[1] + T[2]) -
                           kd[1] kd[2] km[2] T[4]) x[7]^2 + kd[1] kd[2] km[2] x[7]^3 +
              x[4] (-T[4] + (1 + kd[1] T[1] - kcr kd[1] T[2] - kd[1] T[4]) x[7] + kd[1] x[7]^{2} = 0
```

```
subSimpT4 = {-c[1] + c[2] x[7] + c[3] x[7]^2 + c[3] x[7]^5 + c[3]^5 + c[3]^
                                    c[4] x[7]^3 - c[5] x[4] + c[6] x[4] x[7] + c[7] x[4] x[7]^2 = 0
 \left\{-c[1]-c[5]x[4]+c[2]x[7]+\right.
                           c[6] x[4] x[7] + c[3] x[7]^{2} + c[7] x[4] x[7]^{2} + c[4] x[7]^{3} = 0
 simpT3 = Collect[{-km[2]^2T[1](T[3]-x[4])(1+kd[2]x[7])^2} +
                                            km[2] x[4] (1+kd[2] x[7]) (T[1] (T[2]-2T[3]+2x[4]) +
                                                                        kcr T[2] (km[1] + T[1] + T[3] - x[4] + kd[1] km[1] x[7])) +
                                           x[4]^{2}(-kcr^{2}T[2]^{2}+T[1](T[2]-T[3]+x[4])+kcrT[2]
                                                                                  (km[1] + T[1] - T[2] + T[3] - x[4] + kd[1] km[1] x[7]) = 0, \{x[4], x[7]\}
  \left\{ -\,km\,[\,2\,]^{\,2}\,\,T\,[\,1\,]\,\,T\,[\,3\,]\,\,+\,\,(T\,[\,1\,]\,\,-\,kcr\,\,T\,[\,2\,]\,)\,\,\,x\,[\,4\,]^{\,3}\,\,-\,\right.
                           2\;kd[\,2\,]\;km[\,2\,]^{\,2}\;T[\,1\,]\;T[\,3\,]\;x[\,7\,]\;-\;kd[\,2\,]^{\,2}\;km[\,2\,]^{\,2}\;T[\,1\,]\;T[\,3\,]\;x[\,7\,]^{\,2}\;+
                           x[4]^{2} (2 km[2] T[1] + kcr km[1] T[2] - kcr km[2] T[2] + T[1] T[2] +
                                                     \ker T[1] T[2] - \ker T[2]^2 - \ker^2 T[2]^2 - T[1] T[3] + \ker T[2] T[3] +
                                                       (2 kd[2] km[2] T[1] + kcr kd[1] km[1] T[2] - kcr kd[2] km[2] T[2]) x[7]) +
                           x[4] (km[2]^2 T[1] + kcr km[1] km[2] T[2] + km[2] T[1] T[2] +
                                                     kcr \; km[\, 2\, ] \; T[\, 1\, ] \; T[\, 2\, ] \; - \; 2 \; km[\, 2\, ] \; T[\, 1\, ] \; T[\, 3\, ] \; + \; kcr \; km[\, 2\, ] \; T[\, 2\, ] \; T[\, 3\, ] \; + \;
                                                       \left(2\;kd[2]\;km[2]^{2}\;T[1]+kcr\;kd[1]\;km[1]\;km[2]\;T[2]+kcr\;kd[2]\;km[1]\;km[2]\;T[2]+kcr\;kd[2]\;km[1]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]\;T[2]+kcr\;kd[2]\;km[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;kd[2]+kcr\;k
                                                                                 kd[2] km[2] T[1] T[2] + kcr kd[2] km[2] T[1] T[2] -
                                                                                 2 kd[2] km[2] T[1] T[3] + kcr kd[2] km[2] T[2] T[3]) x[7] +
                                                         \left(kd[2]^{2}\;km[2]^{2}\;T[1]\;+\;kcr\;kd[1]\;kd[2]\;km[1]\;km[2]\;T[2]\right)\;x[7]^{2}\right)\;=\;0\,\Big\}
 subSimpT3 = \{-t[1] + t[2] * t[4] ^3 - t[3] x[7] - t[4] x[7] ^2 + t[5] x[4] ^2 + t[5] x[4] ^2 + t[5] x[4] ^3 + t[4] ^4 + t[4] x[7] ^4 + t[5] x[4] ^4 + t[4] ^4 + t[4]
                                    t[6] x[4]^2 x[7] + t[7] x[4] + t[8] x[4] x[7] + t[9] x[7]^2 = 0
 \left\{-t[1] + t[2] t[4]^3 + t[7] x[4] + t[5] x[4]^2 - t[3] x[7] + \right\}
                           t[8] x[4] x[7] + t[6] x[4]^2 x[7] - t[4] x[7]^2 + t[9] x[7]^2 = 0
 Solve[simpT4, x[4]]
 \left\{ \left\{ x\left[4\right] \to \left(km[2] \ T[4] - km[2] \ x[7] - kd[1] \ km[2] \ T[1] \ x[7] - kd[2] \ km[2] \ T[2] \ x[7] + kd[2] \right\} \right\}
                                                     kd[1] km[2] T[4] x[7] + kd[2] km[2] T[4] x[7] - kd[1] km[2] x[7]^{2} -
                                                     kd[2] km[2] x[7]^2 - kd[1] kd[2] km[2] T[1] x[7]^2 - kd[1] kd[2] km[2] T[2] x[7]^2 + kd[1] kd[2] km[2] x[7]^2 + kd[2] km[2]^2 x[7]^2 + kd[2] km[2]^2 x[7]^2 + kd[2] km[2]^2 x[7]^2 + kd[2]^2 x[7]^2 + kd[2]
                                                     kd[1] kd[2] km[2] T[4] x[7]^2 - kd[1] kd[2] km[2] x[7]^3 / (-T[4] + x[7] + x[
                                                     kd[1] \ T[1] \ x[7] - kcr \ kd[1] \ T[2] \ x[7] - kd[1] \ T[4] \ x[7] + kd[1] \ x[7]^2 \big) \big\} \Big\}
Full Simplify [(km[2] T[4] - km[2] x[7] - kd[1] km[2] T[1] x[7] - kd[2] km[2] T[2] x[7] + kd[2] x[2] + kd[2]
                                    kd[1] km[2] T[4] x[7] + kd[2] km[2] T[4] x[7] - kd[1] km[2] x[7]^{2} -
                                    kd[2] km[2] x[7]^2 - kd[1] kd[2] km[2] T[1] x[7]^2 - kd[1] kd[2] km[2] T[2] x[7]^2 +
                                    kd[1] kd[2] km[2] T[4] x[7]^{2} - kd[1] kd[2] km[2] x[7]^{3}
                   \left(-T[4] + x[7] + kd[1] T[1] x[7] - kcr kd[1] T[2] x[7] - kd[1] T[4] x[7] + kd[1] x[7]^{2}\right)
    \left(km[2] \left(-T[4] \left(1+kd[1] \ x[7]\right) \right) \left(1+kd[2] \ x[7]\right) + x[7] \left(1+kd[2] \ \left(T[2]+x[7]\right) + x[7]\right) + x[7] \left(1+kd[2] \left(T[2]+x[7]\right) + x[7]\right) + x[7] \left(T[2]+x[7]\right) +
                                                                       kd[1] (T[1] + x[7] + kd[2] (T[1] + T[2]) x[7] + kd[2] x[7]^{2}))) /
          (T[4] (1+kd[1] x[7]) - x[7] (1+kd[1] (T[1]-kcr T[2]+x[7]))
```

```
t3Sol = Solve[t3, x[7]]
\left\{ \left\{ x\left[ 7\right] \right\} \right\}
                     (2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2]
                                          x[4] - kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] - kd[2] km[2] x[4] - kd[2] x[4] 
                                    kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                                    kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^{2} -
                                    kcr \; kd\,[\,1\,]\;\; km\,[\,1\,]\;\; T\,[\,2\,]\;\; x\,[\,4\,]^{\,2} \; + \; kcr \; kd\,[\,2\,]\;\; km\,[\,2\,]\;\; T\,[\,2\,]\;\; x\,[\,4\,]^{\,2} \; -
                                     \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr kd}[1] \text{ km}[1] \text{ km}[2]}
                                                                               \texttt{T[2]} \ \texttt{x[4]} + \texttt{kcr} \ \texttt{kd[2]} \ \texttt{km[1]} \ \texttt{km[2]} \ \texttt{T[2]} \ \texttt{x[4]} + \texttt{kd[2]} \ \texttt{km[2]} \ \texttt{T[1]} \ \texttt{T[2]} 
                                                                             x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1] T[3] x[4] +
                                                                        kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1] x[4]^2 +
                                                                        kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}
                                                      4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                                        kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] +
                                                                         km[2]^2T[1]x[4] + kcr km[1]km[2]T[2]x[4] + km[2]T[1]T[2]x[4] +
                                                                        kcr \; km[2] \; T[1] \; T[2] \; x[4] \; - \; 2 \; km[2] \; T[1] \; T[3] \; x[4] \; + \; kcr \; km[2] \; T[2] \; T[3]
                                                                              x[4] + 2 km[2] T[1] x[4]^2 + kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 +
                                                                        T[1] T[2] x[4]^2 + kcr T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[2]^2 - kcr^2 T[2]^2 - kcr^2 T[2
                                                                        T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
                         (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                kcr kd[1] kd[2] km[1] km[2] T[2] x[4])
       {x[7] \rightarrow (2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] - }
                                    kcr kd[1] km[1] km[2] T[2] x[4] -
                                    kcr \ kd[2] \ km[1] \ km[2] \ T[2] \ x[4] -
                                    kd[2] km[2] T[1] T[2] x[4] -
                                    kcr kd[2] km[2] T[1] T[2] x[4] +
                                    2 kd[2] km[2] T[1] T[3] x[4] -
                                    kcr kd[2] km[2] T[2] T[3] x[4] -
                                    2 kd[2] km[2] T[1] x[4]^2 - kcr kd[1] km[1] T[2] x[4]^2 +
                                    kcr kd[2] km[2] T[2] x[4]^2 +
                                    \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2]}
                                                                               T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2] T[1] T[2]
                                                                              x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1] T[3] x[4] +
                                                                        kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1] x[4]^2 +
                                                                        kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}
                                                      4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                                        kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] +
                                                                         km[2]^2T[1]x[4] + kcr km[1]km[2]T[2]x[4] + km[2]T[1]T[2]x[4] +
                                                                        kcr \; km[2] \; T[1] \; T[2] \; x[4] \; - \; 2 \; km[2] \; T[1] \; T[3] \; x[4] \; + \; kcr \; km[2] \; T[2] \; T[3]
                                                                              x[4] + 2 km[2] T[1] x[4]^2 + kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 +
                                                                       \texttt{T[1]} \; \texttt{T[2]} \; \texttt{x[4]}^2 + \texttt{kcr} \; \texttt{T[1]} \; \texttt{T[2]} \; \texttt{x[4]}^2 - \texttt{kcr} \; \texttt{T[2]}^2 \; \texttt{x[4]}^2 - \texttt{kcr}^2 + \texttt{kcr}^2 \; \texttt{x[4]}^2 - \texttt{kcr}^2 + \texttt{kcr}^
                                                                        T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
                         (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))
The following is substituting the first solution of x[7]: \frac{-b-\sqrt{(b^2-4 \text{ ac})}}{2 \text{ a}}
t4Inv1 = t4 /. t3Sol[[1]][[1]]
 \{T[4] =
               (2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[2] \text{ km}[2] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ km}[2] \text{ kd}[2] \text{ km}[2] \text{ kd}[2] \text{ km}[2] \text{ kd}[2] \text{ 
                                    kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] -
```

```
kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                      kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^{2} -
                      kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 -
                        \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr kd}[1] \text{ km}[1] \text{ km}[2]}
                                                                                    T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2] T[1] T[2]
                                                                                   x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,1\,]\,\,T\,[\,2\,]\,\,x\,[\,4\,]\,\,-\,2\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,1\,]\,\,T\,[\,3\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,3\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,3\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,3\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,3\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,]\,\,x\,[\,4\,
                                                                          kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1] x[4]^2 +
                                                                           kcr kd[1] km[1] T[2] x[4]^2 - kcr kd[2] km[2] T[2] x[4]^2
                                                 4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                                           kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] +
                                                                           km[2]^2T[1]x[4] + kcr km[1] km[2]T[2]x[4] + km[2]T[1]T[2]x[4] +
                                                                          kcr \; km[\, 2\, ] \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ] \; - \; 2\; km[\, 2\, ] \; T[\, 1\, ] \; T[\, 3\, ] \; x[\, 4\, ] \; + \; kcr \; km[\, 2\, ] \; T[\, 2\, ] \; T[\, 3\, ]
                                                                                   x[4] + 2 km[2] T[1] x[4]^2 + kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 +
                                                                           T[1] \ T[2] \ x[4]^2 + kcr \ T[1] \ T[2] \ x[4]^2 - kcr \ T[2]^2 \ x[4]^2 - kcr^2 \ T[2]^2 \ 
                                                                          T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
       (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] X[4] +
                                       kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) +
kd[2] km[2] T[2] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
                                        kcr kd[1] km[1] km[2] T[2] x[4] -
                                       kcr \; kd[\,2\,] \; km[\,1\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; x[\,2\,] \; x[\,2
                                       kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                                       kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^2 -
                                       kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 -
                                        \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1] \text{ km}[1]}
                                                                                                     km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2]
                                                                                                     T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1]
                                                                                                     T[3] x[4] + kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1]
                                                                                                     x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}
                                                                  4 \, \left(-\,kd\,[\,2\,]^{\,2} \, \,km\,[\,2\,]^{\,2} \, \,T\,[\,1\,] \,\,T\,[\,3\,] \, + \,kd\,[\,2\,]^{\,2} \,\,km\,[\,2\,]^{\,2} \,\,T\,[\,1\,] \,\,x\,[\,4\,] \, + \,kcr\,\,kd\,[\,1\,] \,\,kd\,[\,2\,]
                                                                                                     km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] + km[2]^2 T[1] x[4] + kcr km[
                                                                                                             1] \ km[2] \ T[2] \ x[4] + km[2] \ T[1] \ T[2] \ x[4] + kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ x[4] - kcr \ k
                                                                                            2 \text{ km}[2] \text{ T}[1] \text{ T}[3] \text{ x}[4] + \text{kcr} \text{ km}[2] \text{ T}[2] \text{ T}[3] \text{ x}[4] + 2 \text{ km}[2] \text{ T}[1] \text{ x}[4]^2 +
                                                                                           kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; - \; kcr \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,1\,] \; T[\,2\,
                                                                                            \ker T[1] T[2] x[4]^2 - \ker T[2]^2 x[4]^2 - \ker^2 T[2]^2 x[4]^2 -
                                                                                           T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
       (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] X[4] +
                                        kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                          km[2] + x[4] + kd[2] km[2] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] - 
                                                                                    kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
                                                                                    kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                                                                                    2 \text{ kd}[2] \text{ km}[2] \text{ T}[1] \text{ x}[4]^2 - \text{kcr kd}[1] \text{ km}[1] \text{ T}[2] \text{ x}[4]^2 + \text{kcr kd}[2] \text{ km}[2]
                                                                                            T[2] x[4]^2 - \sqrt{(-2 kd[2] km[2]^2 T[1] T[3] + 2 kd[2] km[2]^2 T[1] x[4] + (-2 kd[2] km[2] x[4] + (-2 kd[2] 
                                                                                                                                        kcr kd[1] km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2]
                                                                                                                                                x\,[\,4\,]\,+\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,1\,]\,\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,1\,]\,\,T\,[\,2\,]
                                                                                                                                                x\,[\,4\,]\,\,-\,2\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,1\,]\,\,T\,[\,3\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,2\,]\,\,T\,[\,3\,]
                                                                                                                                               x[4] + 2 kd[2] km[2] T[1] x[4]^2 + kcr kd[1] km[1] T[2] x[4]^2 -
                                                                                                                                      kcr kd[2] km[2] T[2] x[4]^{2})^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                                                                                                       kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                                                                                                         \left(-\,km\,[\,2\,]^{\,2}\,T\,[\,1\,]\,T\,[\,3\,]\,+\,km\,[\,2\,]^{\,2}\,T\,[\,1\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,1\,]\,\,km\,[\,2\,]\,\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,1\,]\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,1\,]\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,4\,]\,+\,kcr\,\,km\,[\,2\,]\,T\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,[\,2\,]\,\,x\,
                                                                                                                                       km[2] T[1] T[2] x[4] + kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1]
                                                                                                                                                 T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
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kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; - \; kcr \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,]^{\,2} \; + \; kcr \; km[\,
                                                                                                                                   T[1] T[2] x[4]^{2} - kcr T[2]^{2} x[4]^{2} - kcr^{2} T[2]^{2} x[4]^{2} - T[1] T[3]
                                                                                                                                  x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
                                              \left(2 \; \left(-\, kd\,[\,2\,]^{\,2} \; km\,[\,2\,]^{\,2} \; T\,[\,1\,] \; T\,[\,3\,] \; + \; kd\,[\,2\,]^{\,2} \; km\,[\,2\,]^{\,2} \; T\,[\,1\,] \; x\,[\,4\,] \; + \right.
                                                                            kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))
kd[1] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
                                    kcr kd[1] km[1] km[2] T[2] x[4] -
                                    kcr kd[2] km[1] km[2] T[2] x[4] -
                                   kd[2] km[2] T[1] T[2] x[4] -
                                   kcr kd[2] km[2] T[1] T[2] x[4] +
                                    2 kd[2] km[2] T[1] T[3] x[4] -
                                   kcr kd[2] km[2] T[2] T[3] x[4] -
                                    2 \text{ kd}[2] \text{ km}[2] \text{ T}[1] \text{ x}[4]^{2} -
                                   kcr kd[1] km[1] T[2] x[4]^{2} +
                                   kcr kd[2] km[2] T[2] x[4]^{2} -
                                     \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1] \text{ km}[1]}
                                                                                           km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2]
                                                                                           T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1]
                                                                                            T[3] \ x[4] + kcr \ kd[2] \ km[2] \ T[2] \ T[3] \ x[4] + 2 \ kd[2] \ km[2] \ T[1] 
                                                                                           x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}^{2}
                                                            4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2]
                                                                                           km[1] \ km[2] \ T[2] \ x[4] \Big) \ \left( -km[2]^2 \ T[1] \ T[3] + km[2]^2 \ T[1] \ x[4] + kcr \ km[2] \right) \\
                                                                                                   1] \ km[2] \ T[2] \ x[4] + km[2] \ T[1] \ T[2] \ x[4] + kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ 
                                                                                   2 \text{ km}[2] \text{ T}[1] \text{ T}[3] \text{ x}[4] + \text{kcr} \text{ km}[2] \text{ T}[2] \text{ T}[3] \text{ x}[4] + 2 \text{ km}[2] \text{ T}[1] \text{ x}[4]^{2} +
                                                                                   kcr \; km[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; - \; kcr \; km[\, 2\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4
                                                                                  \ker T[1] T[2] x[4]^2 - \ker T[2]^2 x[4]^2 - \ker^2 T[2]^2 x[4]^2 -
                                                                                   T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
                       -km[2]T[1]-T[1]x[4]+kcrT[2]x[4]-(kd[2]km[2]T[1]
                                                              (2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] -
                                                                            kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
                                                                            kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                                                                            2\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;km[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;-\;kcr\;kd[\,2\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,
                                                                            2\;kd[2]\;km[2]\;T[1]\;x[4]^2-kcr\;kd[1]\;km[1]\;T[2]\;x[4]^2+kcr\;kd[2]\;km[2]
                                                                                 T[2] \times [4]^2 - \sqrt{\left(\left(-2 \text{ kd}[2] \text{ km}[2]^2 T[1] T[3] + 2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + 2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + 2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + 2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + 2 \text{ kd}[2] \times [4]^2 + 2 \text{ kd}[2]^2 + 2 \text{ kd}[2]^2 \times [4]^2 + 2 \text{ kd}[2]^2 + 2 \text{ k
                                                                                                                           kcr kd[1] km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2]
                                                                                                                                   x[4] + kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2]
                                                                                                                                   x[4] - 2 kd[2] km[2] T[1] T[3] x[4] + kcr kd[2] km[2] T[2] T[3]
                                                                                                                                   x[4] + 2 kd[2] km[2] T[1] x[4]^2 + kcr kd[1] km[1] T[2] x[4]^2 -
                                                                                                                          kcr kd[2] km[2] T[2] x[4]^{2}^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                                                                                           kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                                                                                            (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                                                                                                          km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,+kcr\,\,km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,-2\,\,km[\,2\,]\,\,T[\,1\,]
                                                                                                                                  T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^{2} +
                                                                                                                          kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; - \; kcr \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,4\,]^{\,2} \;
                                                                                                                                 T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                                                                                                                 x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
                                              (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                                           kcr kd[1] kd[2] km[1] km[2] T[2] x[4])))/
       (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] X[4] +
                                    kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                       (1 + (kd[1] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
```

```
kcr \ kd[1] \ km[1] \ km[2] \ T[2] \ x[4] - kcr \ kd[2] \ km[1] \ km[2] \ T[2] \ x[4] -
                          kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                          2 kd[2] km[2] T[1] x[4]^{2} - kcr kd[1] km[1] T[2] x[4]^{2} + kcr kd[2] km[2]
                             T[2] x[4]^2 - \sqrt{(-2 kd[2] km[2]^2 T[1] T[3] + 2 kd[2] km[2]^2 T[1] x[4] + (-2 kd[2] km[2]^2 T[1] x[4])}
                                                  kcr kd[1] km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2]
                                                      x[4] + kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2]
                                                     x[4] - 2 kd[2] km[2] T[1] T[3] x[4] + kcr kd[2] km[2] T[2] T[3]
                                                     x[4] + 2 kd[2] km[2] T[1] x[4]^2 + kcr kd[1] km[1] T[2] x[4]^2 -
                                                 kcr kd[2] km[2] T[2] x[4]^{2}^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                  kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                          (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                                 km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,\,+\,kcr\,\,km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,\,-\,2\,\,km[\,2\,]\,\,T[\,1\,]
                                                     T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
                                                 kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; - \; kcr \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,4\,]^{\,2} \;
                                                     T[1] T[2] x[4]^{2} - kcr T[2]^{2} x[4]^{2} - kcr^{2} T[2]^{2} x[4]^{2} - T[1] T[3]
                                                     x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
          (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                          kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))
(km[2] + x[4] + (kd[2] km[2] (2 kd[2] km[2]^2 T[1] T[3] -
                          2 kd[2] km[2]^2 T[1] x[4] - kcr kd[1] km[1] km[2] T[2] x[4] -
                          kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] -
                          kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                          kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^{2} -
                         kcr \; kd[1] \; km[1] \; T[2] \; x[4]^2 + kcr \; kd[2] \; km[2] \; T[2] \; x[4]^2 - \\
                         \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1]}
                                                      km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] +
                                                  kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] -
                                                  2 kd[2] km[2] T[1] T[3] x[4] + kcr kd[2] km[2] T[2] T[3] x[4] +
                                                  2 kd[2] km[2] T[1] x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} -
                                                 kcr kd[2] km[2] T[2] x[4]^{2}^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                 kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                          (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                                  km[2] T[1] T[2] x[4] + kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1]
                                                      T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
                                                 kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; - \; kcr \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,]^{\,2} \; + \; kcr \; km[\,
                                                     T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                                     x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
           \left(2 \, \left(-\, kd \, [\, 2\, ]^{\, 2} \, \, km \, [\, 2\, ]^{\, 2} \, \, T \, [\, 1\, ] \, \, T \, [\, 3\, ] \, + kd \, [\, 2\, ]^{\, 2} \, \, km \, [\, 2\, ]^{\, 2} \, \, T \, [\, 1\, ] \, \, x \, [\, 4\, ] \, + \right.
                          kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))))
```

The following is the second solution  $\frac{-b+\sqrt{(b^2-4\,\mathrm{ac})}}{2\,a}$ , as we studied that the system is monostable thus the following is inverse function of solution x[4],  $T_4 == f(x_4)$ . And this function should also be monotone. Suppose this solution is positive real then  $\sqrt{(b^2 - 4 \text{ ac})}$  should be positive real.

```
-b = 2 kd[2] km[2]^2 T[1] T[3] -
                        2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] -
                      kcr\;kd[\,2\,]\;km[\,1\,]\;km[\,2\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;km[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;-\;kd[\,2\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]
                      kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                      kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^{2} -
                       kcr \; kd[1] \; km[1] \; T[2] \; x[4]^2 + kcr \; kd[2] \; km[2] \; T[2] \; x[4]^2
```

```
Simplify [2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
            kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
            kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
            2 kd[2] km[2] T[1] T[3] x[4] - kcr kd[2] km[2] T[2] T[3] x[4] -
            2 \text{ kd}[2] \text{ km}[2] \text{ T}[1] \times [4]^2 - \text{ker kd}[1] \text{ km}[1] \text{ T}[2] \times [4]^2 + \text{ker kd}[2] \text{ km}[2] \text{ T}[2] \times [4]^2
-kcr kd[1] km[1] T[2] x[4] (km[2] + x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (T[3] - x[4]) + kd[2] km[2] (2 km[2] T[1] (2 km[2] - x[4]) + kd[2] km[2] (2 km[2] T[1] (2 km[2] - x[4]) + kd[2] km[2] (2 km[2] T[1] (2 km[2] - x[4]) + kd[2] km[2] km[2] (2 km[2] - x[4]) + kd[2] km[2] km[2] + kd[2] km[2] km[2] km[2] + kd[2] km[2] km[
                        x[4] (-kcr T[2] (km[1] + T[1] + T[3] - x[4]) - T[1] (T[2] - 2T[3] + 2x[4])))
And we have the non-trivial solution of inverse function of solution x[4].
t4Inv2 = t4 /. t3Sol[[2]]
\{T[4] =
                \left[2 \text{ kd}[2] \text{ km}[2]^{2} \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^{2} \text{ T}[1] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[2] \text{ kd}[2] \text{
                                    kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] -
                                    kcr \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; + \; 2\; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,3\,] \; x[\,4\,] \; - \;
                                    kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^{2} -
                                    kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 +
                                     \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr kd}[1] \text{ km}[1] \text{ km}[2]}
                                                                               T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2] T[1] T[2]
                                                                               x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1] T[3] x[4] +
                                                                         kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1] x[4]^2 +
                                                                         kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2})^{2} -
                                                      4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                                         kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] +
                                                                         km[2]^2T[1]x[4] + kcr km[1]km[2]T[2]x[4] + km[2]T[1]T[2]x[4] +
                                                                         kcr \ km[2] \ T[1] \ T[2] \ x[4] - 2 \ km[2] \ T[1] \ T[3] \ x[4] + kcr \ km[2] \ T[2] \ T[3]
                                                                               x[4] + 2 km[2] T[1] x[4]^{2} + kcr km[1] T[2] x[4]^{2} - kcr km[2] T[2] x[4]^{2} +
                                                                         T[1] T[2] x[4]^2 + kcr T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[2]^2 - kc
                                                                         T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
                         (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] X[4] +
                                                kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) +
                    kd[2] km[2] T[2] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
                                                kcr kd[1] km[1] km[2] T[2] x[4] -
                                                kcr \; kd[\,2\,] \; km[\,1\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,2\,] \; x[\,4\,] \; - \; kd[\,2\,] \; km[\,2\,] \; x[\,2\,] \; x[\,2
                                                kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                                                kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^{2} -
                                                kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 +
                                                \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr kd}[1] \text{ km}[1]}
                                                                                           km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2]
                                                                                           T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1]
                                                                                            \texttt{T[3]} \ \texttt{x[4]} + \texttt{kcr} \ \texttt{kd[2]} \ \texttt{km[2]} \ \texttt{T[2]} \ \texttt{T[3]} \ \texttt{x[4]} + \texttt{2} \ \texttt{kd[2]} \ \texttt{km[2]} \ \texttt{T[1]} 
                                                                                           x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}
                                                                   4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2]
                                                                                           km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] + km[2]^2 T[1] x[4] + kcr km[
                                                                                                 1] \ km[2] \ T[2] \ x[4] + km[2] \ T[1] \ T[2] \ x[4] + kcr \ km[2] \ T[1] \ T[2] \ x[4] - \\
                                                                                     2 \text{ km}[2] \text{ T}[1] \text{ T}[3] \text{ x}[4] + \text{kcr} \text{ km}[2] \text{ T}[2] \text{ T}[3] \text{ x}[4] + 2 \text{ km}[2] \text{ T}[1] \text{ x}[4]^2 +
                                                                                     kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; - \; kcr \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,2\,] \; x[\,4\,
                                                                                     kcr T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 -
                                                                                     T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
                          (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
```

```
kcr \ kd[1] \ km[1] \ km[2] \ T[2] \ x[4] - kcr \ kd[2] \ km[1] \ km[2] \ T[2] \ x[4] -
                                                   kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                                                   2 kd[2] km[2] T[1] x[4]^{2} - kcr kd[1] km[1] T[2] x[4]^{2} + kcr kd[2] km[2]
                                                       T[2] x[4]^2 + \sqrt{(-2 kd[2] km[2]^2 T[1] T[3] + 2 kd[2] km[2]^2 T[1] x[4] + (-2 kd[2] km[2]^2 T[1] x[4])}
                                                                                   kcr \ kd[1] \ km[1] \ km[2] \ T[2] \ x[4] + kcr \ kd[2] \ km[1] \ km[2] \ T[2]
                                                                                        x[4] + kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2]
                                                                                       x\,[\,4\,]\,\,-\,2\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,1\,]\,\,T\,[\,3\,]\,\,x\,[\,4\,]\,\,+\,kcr\,\,kd\,[\,2\,]\,\,km\,[\,2\,]\,\,T\,[\,2\,]\,\,T\,[\,3\,]
                                                                                       x[4] + 2 kd[2] km[2] T[1] x[4]^2 + kcr kd[1] km[1] T[2] x[4]^2 -
                                                                                  kcr kd[2] km[2] T[2] x[4]^{2}^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                                                   kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                                                         (-km[2]^2T[1]T[3] + km[2]^2T[1]x[4] + kcr km[1]km[2]T[2]x[4] +
                                                                                  km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,\,+\,kcr\,\,km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,\,-\,2\,\,km[\,2\,]\,\,T[\,1\,]
                                                                                       T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
                                                                                  kcr \; km[\, 1] \; T[\, 2] \; x[\, 4\, ]^{\, 2} \; - \; kcr \; km[\, 2\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; kcr
                                                                                       T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                                                                       x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
                               \left(2 \, \left(-\, kd\, [\, 2\, ]^{\, 2} \, \, km\, [\, 2\, ]^{\, 2}\, \, T\, [\, 1\, ] \, \, T\, [\, 3\, ] \, + kd\, [\, 2\, ]^{\, 2}\, \, km\, [\, 2\, ]^{\, 2}\, \, T\, [\, 1\, ] \, \, x\, [\, 4\, ] \, + \right.
                                                  kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))
(kd[1] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
                        kcr kd[1] km[1] km[2] T[2] x[4] -
                        kcr kd[2] km[1] km[2] T[2] x[4] -
                        kd[2] km[2] T[1] T[2] x[4] -
                        kcr kd[2] km[2] T[1] T[2] x[4] +
                        2 kd[2] km[2] T[1] T[3] x[4] -
                        kcr kd[2] km[2] T[2] T[3] x[4] -
                        2 \text{ kd}[2] \text{ km}[2] \text{ T}[1] \text{ x}[4]^{2}
                        kcr kd[1] km[1] T[2] x[4]^{2} +
                        kcr kd[2] km[2] T[2] x[4]^2 +
                        \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr kd}[1] \text{ km}[1]}
                                                             km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2]
                                                             T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1]
                                                               T[3] \ x[4] + kcr \ kd[2] \ km[2] \ T[2] \ T[3] \ x[4] + 2 \ kd[2] \ km[2] \ T[1] 
                                                             x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}
                                        4 \, \left( - \, kd \, [\, 2\, ]^{\, 2} \, \, km \, [\, 2\, ]^{\, 2} \, \, T \, [\, 1\, ] \, \, T \, [\, 3\, ] \, + \, kd \, [\, 2\, ]^{\, 2} \, \, km \, [\, 2\, ]^{\, 2} \, \, T \, [\, 1\, ] \, \, x \, [\, 4\, ] \, + \, kcr \, \, kd \, [\, 1\, ] \, \, kd \, [\, 2\, ]
                                                             km[1] km[2] T[2] x[4] (-km[2]^2 T[1] T[3] + km[2]^2 T[1] x[4] + kcr km[
                                                                   1] \ km[2] \ T[2] \ x[4] + km[2] \ T[1] \ T[2] \ x[4] + kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ km[2] \ x[4] \ x[4] - kcr \ km[2] \ x[4] - kcr \ km[2] \ x[4] \ x[4] \ x[4] - kcr \ km[2] \ x[4] \ x[4] \ x[4] - kcr \ km[2] \ x[4] \ 
                                                        2 \text{ km}[2] \text{ T}[1] \text{ T}[3] \text{ x}[4] + \text{kcr} \text{ km}[2] \text{ T}[2] \text{ T}[3] \text{ x}[4] + 2 \text{ km}[2] \text{ T}[1] \text{ x}[4]^2 + 2 \text{ km}[2] \text{ x}[4]^2 + 2 \text{ km}[2]^2 + 
                                                        kcr \; km[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; - \; kcr \; km[\, 2\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 1\, ] \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 2} \; + \; T[\, 2\, ] \; x[\, 4\, ]^{\, 
                                                        \ker T[1] T[2] x[4]^2 - \ker T[2]^2 x[4]^2 - \ker^2 T[2]^2 x[4]^2 -
                                                        T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
              -km[2]T[1]-T[1]x[4]+kcrT[2]x[4]-(kd[2]km[2]T[1]
                                           (2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] -
                                                   kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
                                                   kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                                                   2 kd[2] km[2] T[1] T[3] x[4] - kcr kd[2] km[2] T[2] T[3] x[4] -
                                                  2\;kd[2]\;km[2]\;T[1]\;x[4]^2-kcr\;kd[1]\;km[1]\;T[2]\;x[4]^2+kcr\;kd[2]\;km[2]
                                                        T[2] x[4]^2 + \sqrt{(-2 kd[2] km[2]^2 T[1] T[3] + 2 kd[2] km[2]^2 T[1] x[4] + (-2 kd[2] km[2] km[2]^2 T[1] x[4] + (-2 kd[2] km[2] km[2] x[4] + (-2 kd[2] km[2] km[2] x[4] + (-2 kd[2] km[2] x[4] + (-2 kd[2] km[2] km[2] x[4] + (-2 kd[2]
                                                                                  kcr kd[1] km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2]
                                                                                       x[4] + kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2]
                                                                                       x[4] - 2 kd[2] km[2] T[1] T[3] x[4] + kcr kd[2] km[2] T[2] T[3]
                                                                                        x[4] + 2 kd[2] km[2] T[1] x[4]^2 + kcr kd[1] km[1] T[2] x[4]^2 -
```

```
kcr kd[2] km[2] T[2] x[4]^{2})^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                                                           kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                                                                (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                                                                           km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,+kcr\,\,km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,-2\,\,km[\,2\,]\,\,T[\,1\,]
                                                                                                 T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
                                                                                           kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; - \; kcr \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,]^{\,2} \; 
                                                                                                 T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                                                                                 x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
                              \left(2 \, \left(-\, kd\, [\, 2\, ]^{\, 2} \, km\, [\, 2\, ]^{\, 2}\, T\, [\, 1\, ]\, T\, [\, 3\, ]\, + kd\, [\, 2\, ]^{\, 2}\, km\, [\, 2\, ]^{\, 2}\, T\, [\, 1\, ]\, x\, [\, 4\, ]\, + \right.
                                                     kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))
(2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] X[4] +
                       kcr\;kd[\,1\,]\;kd[\,2\,]\;km[\,1\,]\;km[\,2\,]\;T[\,2\,]\;x[\,4\,]\,\big)
            (1 + (kd[1] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] - (kd[1] (2 kd[2] km[2]^2 T[1] x[4] - (kd[2] km[2]^2 T[2] x[4] - (kd[2] km[2] x[4] - (kd[2] km[2] x[4] - (kd[2] km[2] x[4] - (kd[2] km[2] x[4
                                                      kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
                                                      kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                                                      2 kd[2] km[2] T[1] T[3] x[4] - kcr kd[2] km[2] T[2] T[3] x[4] -
                                                      2\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;x[\,4\,]^{\,2}\;-\;kcr\;kd[\,1\,]\;km[\,1\,]\;T[\,2\,]\;x[\,4\,]^{\,2}\;+\;kcr\;kd[\,2\,]\;km[\,2\,]
                                                           T[2] x[4]^2 + \sqrt{(-2 kd[2] km[2]^2 T[1] T[3] + 2 kd[2] km[2]^2 T[1] x[4] + (-2 kd[2] km[2] km[2]^2 T[1] x[4] + (-2 kd[2] km[2] km[2] x[4] + (-2 kd[2] km[2] x[4] + (-2 kd[2] km[2] x[4] + (-2 kd[2] km[2] x[4]
                                                                                           kcr \; kd[\,1\,] \; km[\,1\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,] \; + kcr \; kd[\,2\,] \; km[\,1\,] \; km[\,2\,] \; T[\,2\,]
                                                                                                  x[4] + kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2]
                                                                                                  x[4] - 2 kd[2] km[2] T[1] T[3] x[4] + kcr kd[2] km[2] T[2] T[3]
                                                                                                 x[4] + 2 kd[2] km[2] T[1] x[4]^2 + kcr kd[1] km[1] T[2] x[4]^2 -
                                                                                          kcr kd[2] km[2] T[2] x[4]^{2})^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                                                           kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                                                                (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                                                                            km[2] T[1] T[2] x[4] + kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1]
                                                                                                  T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
                                                                                           kcr \; km[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; - \; kcr \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; T[\,1\,] \; T[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,2\,] \; x[\,4\,]^{\,2} \; + \; kcr \; km[\,4\,]^{\,2} \;
                                                                                                 T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                                                                                 x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
                               (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                      kcr kd[1] kd[2] km[1] km[2] T[2] x[4])
             (km[2] + x[4] + (kd[2] km[2] (2 kd[2] km[2]^2 T[1] T[3] -
                                                      2\;kd[\,2\,]\;km[\,2\,]^{\,2}\;T[\,1\,]\;x[\,4\,]\;-\;kcr\;kd[\,1\,]\;km[\,1\,]\;km[\,2\,]\;T[\,2\,]\;x[\,4\,]\;-\;
                                                      kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] -
                                                      kcr \; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,2\,] \; x[\,4\,] \; + \; 2\; kd[\,2\,] \; km[\,2\,] \; T[\,1\,] \; T[\,3\,] \; x[\,4\,] \; - \;
                                                      kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^{2} -
                                                      kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 +
                                                      \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr kd}[1]}
                                                                                                 km[1] \ km[2] \ T[2] \ x[4] + kcr \ kd[2] \ km[1] \ km[2] \ T[2] \ x[4] + \\
                                                                                           kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,2\,]\;x[\,4\,]\;-\;
                                                                                            2\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;km[\,2\,]\;T[\,3\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;+\;kcr\;kd[\,2\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;x[\,4\,]\;
                                                                                            2\;kd[\,2\,]\;km[\,2\,]\;T[\,1\,]\;x[\,4\,]^{\,2}+kcr\;kd[\,1\,]\;km[\,1\,]\;T[\,2\,]\;x[\,4\,]^{\,2}-\\
                                                                                           kcr kd[2] km[2] T[2] x[4]^{2}^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                                                           kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                                                                (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                                                                           km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,+kcr\,\,km[\,2\,]\,\,T[\,1\,]\,\,T[\,2\,]\,\,x[\,4\,]\,-2\,\,km[\,2\,]\,\,T[\,1\,]
                                                                                                 T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
                                                                                          kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 + T[1] T[2] x[4]^2 + kcr
                                                                                                  T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                                                                                  x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3
```

```
(2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] X[4] +
                                              kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))))
finverse = Simplify|
        (2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] - \text{kcr} \text{ kd}[1] \text{ km}[2] \text{ kd}[2] \text{ km}[2] \text{ kd}[2] 
                     kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] -
                    kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                    kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^2 -
                    kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 +
                     \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2]}
                                              T[2] \times [4] + kcr kd[2] km[1] km[2] T[2] \times [4] + kd[2] km[2] T[1] T[2]
                                             x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1] T[3] x[4] +
                                          kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1] x[4]^{2} +
                                          kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2})^{2} -
                               4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                          kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] +
                                          km[2]^2T[1]x[4] + kcr km[1]km[2]T[2]x[4] + km[2]T[1]T[2]x[4] +
                                          kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1] T[3] x[4] + kcr km[2] T[2] T[3]
                                              x[4] + 2 km[2] T[1] x[4]^2 + kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 +
                                          T[1] T[2] x[4]^2 + kcr T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 -
                                          T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)))
              (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                           kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) +
           kd[2] km[2] T[2] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
                            kcr kd[1] km[1] km[2] T[2] x[4] -
                           kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] -
                           kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                           kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^2 -
                           kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 +
                            \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1] \text{ km}[1]}
                                                     km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2]
                                                     T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1]
                                                     T[3] x[4] + kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1]
                                                     x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}
                                      4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2]
                                                     km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] + km[2]^2 T[1] x[4] + kcr km[
                                                        1] km[2] T[2] x[4] + km[2] T[1] T[2] x[4] + kcr km[2] T[1] T[2] x[4] -
                                                 2 \text{ km}[2] \text{ T}[1] \text{ T}[3] \text{ x}[4] + \text{kcr} \text{ km}[2] \text{ T}[2] \text{ T}[3] \text{ x}[4] + 2 \text{ km}[2] \text{ T}[1] \text{ x}[4]^{2} +
                                                 kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 + T[1] T[2] x[4]^2 +
                                                 kcr T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 -
                                                 T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
              (2(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                            kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                      km[2] + x[4] + kd[2] km[2] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
                                              kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
                                              kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                                              2 kd[2] km[2] T[1] T[3] x[4] - kcr kd[2] km[2] T[2] T[3] x[4] -
                                              2 \text{ kd}[2] \text{ km}[2] \text{ T}[1] \text{ x}[4]^2 - \text{kcr kd}[1] \text{ km}[1] \text{ T}[2] \text{ x}[4]^2 + \text{kcr kd}[2] \text{ km}[2]
                                                 T[2] \times [4]^2 + \sqrt{(-2 \text{ kd}[2] \text{ km}[2]^2 T[1] T[3] + 2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2]^2 T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[1] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] \text{ km}[2] T[2] \times [4] + (-2 \text{ kd}[2] T[2] \times [4] + (-2 \text{ k
                                                                   kcr kd[1] km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2]
                                                                       x[4] + kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2]
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x[4] - 2 kd[2] km[2] T[1] T[3] x[4] + kcr kd[2] km[2] T[2] T[3]
                                     x[4] + 2 kd[2] km[2] T[1] x[4]^2 + kcr kd[1] km[1] T[2] x[4]^2 -
                                  kcr kd[2] km[2] T[2] x[4]^{2}^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                  kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                               (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                  km[2] T[1] T[2] x[4] + kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1]
                                     T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
                                  kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 + T[1] T[2] x[4]^2 + kcr
                                     T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                     x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
             (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                     kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))) -
kd[1] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
          kcr kd[1] km[1] km[2] T[2] x[4] -
          kcr kd[2] km[1] km[2] T[2] x[4] -
          kd[2] km[2] T[1] T[2] x[4] -
          kcr kd[2] km[2] T[1] T[2] x[4] +
          2 kd[2] km[2] T[1] T[3] x[4] -
          kcr kd[2] km[2] T[2] T[3] x[4] -
          2 \text{ kd}[2] \text{ km}[2] \text{ T}[1] \text{ x}[4]^2 - \text{kcr kd}[1] \text{ km}[1] \text{ T}[2] \text{ x}[4]^2 +
          kcr kd[2] km[2] T[2] x[4]^2 +
          \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1] \text{ km}[1]}
                          km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2]
                          T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1]
                          T[3] \times [4] + kcr kd[2] km[2] T[2] T[3] \times [4] + 2 kd[2] km[2] T[1]
                          x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}^{2} -
                 4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2]
                          km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] + km[2]^2 T[1] x[4] + kcr km[
                            1] km[2] T[2] x[4] + km[2] T[1] T[2] x[4] + kcr km[2] T[1] T[2] x[4] -
                       2 \text{ km}[2] \text{ T}[1] \text{ T}[3] \text{ x}[4] + \text{kcr km}[2] \text{ T}[2] \text{ T}[3] \text{ x}[4] + 2 \text{ km}[2] \text{ T}[1] \text{ x}[4]^{2} +
                       kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 + T[1] T[2] x[4]^2 +
                       kcr T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 -
                       T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)
      -km[2]T[1]-T[1]x[4]+kcrT[2]x[4]-(kd[2]km[2]T[1]
                 (2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] -
                     kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
                     kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                     2 kd[2] km[2] T[1] T[3] x[4] - kcr kd[2] km[2] T[2] T[3] x[4] -
                     2 kd[2] km[2] T[1] x[4]^{2} - kcr kd[1] km[1] T[2] x[4]^{2} + kcr kd[2] km[2]
                       T[2] x[4]^2 + \sqrt{(-2 kd[2] km[2]^2 T[1] T[3] + 2 kd[2] km[2]^2 T[1] x[4] + (-2 kd[2] km[2] x[4] + (-2 kd[2
                                  kcr kd[1] km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2]
                                     x[4] + kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2]
                                     x[4] - 2 kd[2] km[2] T[1] T[3] x[4] + kcr kd[2] km[2] T[2] T[3]
                                     x[4] + 2 kd[2] km[2] T[1] x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} -
                                  kcr kd[2] km[2] T[2] x[4]^{2})^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                  kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                               (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                  km[2] T[1] T[2] x[4] + kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1]
                                     T[3] x[4] + kcr km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 +
                                  kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 + T[1] T[2] x[4]^2 + kcr
                                     T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                     x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
```

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(2(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                         kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))))
            (2(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                         kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                   1 + (kd[1] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] - (kd[1] (2 kd[2] km[2]^2 T[1] x[4] - (kd[2] km[2] x[4] - (kd[2] km[2]^2 T[1] x[4] - (kd[2] km[2]^2 T[1] x[4] - (kd[2] km[2] x[4] - (kd[2] km[
                                         kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
                                         kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
                                         2 kd[2] km[2] T[1] T[3] x[4] - kcr kd[2] km[2] T[2] T[3] x[4] -
                                         2 kd[2] km[2] T[1] x[4]^{2} - kcr kd[1] km[1] T[2] x[4]^{2} +
                                         2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \text{ x}[4] +
                                                            kcr kd[2] km[1] km[2] T[2] x[4] + kd[2] km[2] T[1] T[2] x[4] +
                                                            kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1] T[3] x[4] +
                                                            kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1] x[4]^{2} +
                                                            kcr kd[1] km[1] T[2] x[4]^{2} - kcr kd[2] km[2] T[2] x[4]^{2}
                                                  4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                                            kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] +
                                                            km[2]^2T[1]x[4] + kcr km[1]km[2]T[2]x[4] + km[2]T[1]T[2]
                                                               x[4] + kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1] T[3] x[4] + kcr
                                                               km[2] T[2] T[3] x[4] + 2 km[2] T[1] x[4]^2 + kcr km[1] T[2] x[4]^2 -
                                                            kcr km[2] T[2] x[4]^2 + T[1] T[2] x[4]^2 + kcr T[1] T[2] x[4]^2 -
                                                            kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3] x[4]^2 +
                                                            kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
                             (2 (-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                                         kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))
                   (km[2] + x[4] + (kd[2] km[2] (2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2]
                                            km[2]^2T[1]x[4]-kcrkd[1]km[1]km[2]T[2]x[4]-
                                         kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] -
                                         kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
                                         kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^2 -
                                         kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 +
                                         \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr kd}[1]}
                                                                km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] +
                                                            kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] -
                                                            2 kd[2] km[2] T[1] T[3] x[4] + kcr kd[2] km[2] T[2] T[3] x[4] +
                                                            2 kd[2] km[2] T[1] x[4]^{2} + kcr kd[1] km[1] T[2] x[4]^{2} -
                                                            kcr kd[2] km[2] T[2] x[4]^{2}^{2} - 4 (-kd[2]^{2} km[2]^{2} T[1] T[3] +
                                                            kd[2]^2 km[2]^2 T[1] x[4] + kcr kd[1] kd[2] km[1] km[2] T[2] x[4]
                                                       (-km[2]^2T[1]T[3]+km[2]^2T[1]x[4]+kcrkm[1]km[2]T[2]x[4]+
                                                            km[2] T[1] T[2] x[4] + kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1]
                                                                T[3] \times [4] + kcr km[2] T[2] T[3] \times [4] + 2 km[2] T[1] \times [4]^{2} +
                                                            kcr km[1] T[2] x[4]^2 - kcr km[2] T[2] x[4]^2 + T[1] T[2] x[4]^2 + kcr
                                                                T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 - T[1] T[3]
                                                                x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3))))
                            (2(-kd[2]^2km[2]^2T[1]T[3]+kd[2]^2km[2]^2T[1]x[4]+
                                         kcr kd[1] kd[2] km[1] km[2] T[2] x[4]))))
(2 kd[2] km[2]^2 T[1] T[3] - 2 kd[2] km[2]^2 T[1] x[4] -
               kcr kd[1] km[1] km[2] T[2] x[4] - kcr kd[2] km[1] km[2] T[2] x[4] -
               kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] +
               2 kd[2] km[2] T[1] T[3] x[4] - kcr kd[2] km[2] T[2] T[3] x[4] -
               2 \text{ kd}[2] \text{ km}[2] \text{ T}[1] \text{ x}[4]^2 - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ T}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ T}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text{ km}[2] \text{ x}[4]^2 + \text{kcr} \text{ kd}[2] \text{ km}[2] \text
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\sqrt{(-4 \text{ kd}[2] \text{ km}[2] (\text{kcr kd}[1] \text{ km}[1] \text{ T}[2] \text{ x}[4] + \text{kd}[2] \text{ km}[2] \text{ T}[1] (-\text{T}[3] + \text{x}[4]))}
                          (km[2]^2T[1](-T[3]+x[4])+x[4]^2(-kcr^2T[2]^2+kcrT[2](km[1]+T[1]-kcr^2T[2])
                                                                           T[2] + T[3] - x[4]) + T[1] (T[2] - T[3] + x[4]) + km[2] x[4]
                                              (\ker T[2] (km[1] + T[1] + T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4]))) +
                    (kcr kd[1] km[1] T[2] x[4] (km[2] + x[4]) + kd[2] km[2]
                                              (2 km[2] T[1] (-T[3] + x[4]) + x[4] (kcr T[2] (km[1] + T[1] +
                                                                                              T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4]))))^2)) (1 +
  (2 \, kd[2] \, km[2] \, T[2] \, (kd[2] \, km[2] \, T[1] \, (T[3] - x[4]) \, - \, kcr \, kd[1] \, km[1] \, T[2] \, x[4]) \, ) \, \Big/ \, (2 \, kd[2] \, km[2] \, T[2] \, (kd[2] \, km[2] \, T[2] \, x[4]) \, ) \, \Big/ \, (2 \, kd[2] \, km[2] \, T[2] \, (kd[2] \, km[2] \, T[2] \, x[4]) \, ) \, \Big/ \, (2 \, kd[2] \, km[2] \, T[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, T[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, T[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, T[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, km[2] \, x[4]) \, \Big/ \, (2 \, kd[2] \, x[4]) \, \Big
       (-kcr kd[1] km[1] km[2] T[2] x[4] + kcr kd[2] km[1] km[2] T[2] x[4] +
                   kd[2] km[2] T[1] T[2] x[4] + kcr kd[2] km[2] T[1] T[2] x[4] +
                  kcr kd[2] km[2] T[2] T[3] x[4] - kcr kd[1] km[1] T[2] x[4]^{2} -
                   kcr \; kd[\,2\,] \; km[\,2\,] \; T[\,2\,] \; x[\,4\,]^{\,2} - \sqrt{\, \left(-\,4\,\,kd[\,2\,] \; km[\,2\,] \right.} 
                                              (kcr\;kd[1]\;km[1]\;T[2]\;x[4]\;+kd[2]\;km[2]\;T[1]\;\;(-T[3]\;+x[4]\,)\,)
                                              (km[2]^2T[1](-T[3]+x[4])+x[4]^2(-kcr^2T[2]^2+kcrT[2](km[1]+T[1]-kcr^2T[2]^2+kcr^2T[2])
                                                                                              T[2] + T[3] - x[4]) + T[1] (T[2] - T[3] + x[4])) + km[2] x[4]
                                                                (\ker T[2] (km[1] + T[1] + T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4])) +
                                       (kcr kd[1] km[1] T[2] x[4] (km[2] + x[4]) + kd[2] km[2]
                                                                (2\;km[\,2\,]\;T[\,1\,]\;\;(-T[\,3\,]\;+x[\,4\,]\;)\;+x[\,4\,]\;\;(kcr\;T[\,2\,]\;\;(km[\,1\,]\;+T[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]\;+x[\,1\,]
                                                                                                                T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4])))^{2}
  \left(2\;kd[1]\;kd[2]\;km[2]\;(kcr\;kd[1]\;km[1]\;T[2]\;x[4]+kd[2]\;km[2]\;T[1]\;(-T[3]+x[4])\right) 
                    (\ker kd[1] km[1] km[2] T[1] T[2] x[4] - \ker kd[2] km[1] km[2] T[1] T[2] x[4] - \ker kd[1] km[1] km[2] T[1] T[2] x[4] - \ker kd[1] km[1] km[2] T[1] T[2] x[4] - \ker kd[1] km[1] km[1] km[2] T[1] T[2] x[4] - \ker kd[1] km[1] km[1] km[2] T[1] T[2] x[4] - \ker kd[1] km[1] km[2] T[1] tm[1] km[1] km[1]
                               kd[2] km[2] T[1]^2 T[2] x[4] - kcr kd[2] km[2] T[1]^2 T[2] x[4] +
                               kcr kd[2] km[2] T[1] T[2] T[3] x[4] + kcr kd[1] km[1] T[1] T[2] x[4]^2 -
                               kcr kd[2] km[2] T[1] T[2] x[4]^2 - 2 kcr^2 kd[1] km[1] T[2]^2 x[4]^2 +
                               T[1] \sqrt{-4 \text{ kd}[2] \text{ km}[2] \text{ (kcr kd}[1] \text{ km}[1] T[2] x[4] + }
                                                                           kd[2] km[2] T[1] (-T[3] + x[4])) (km[2]^2 T[1] (-T[3] + x[4]) +
                                                                           x[4]^{2}(-kcr^{2}T[2]^{2}+kcrT[2](km[1]+T[1]-T[2]+T[3]-x[4])+
                                                                                              T[1] (T[2] - T[3] + x[4])) + km[2] x[4] (kcr T[2])
                                                                                                      (km[1] + T[1] + T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4])) +
                                                          (kcr kd[1] km[1] T[2] x[4] (km[2] + x[4]) + kd[2] km[2]
                                                                                   (2\;km[\,2\,]\;T[\,1\,]\;\;(-T[\,3\,]\;+x[\,4\,]\;)\;+x[\,4\,]\;\;(kcr\;T[\,2\,]\;\;(km[\,1\,]\;+T[\,1\,]\;+
                                                                                                                                   T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4]))))^{2}))
        \big( \big( kcr \; kd[1] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[1] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; km[2] \; T[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; km[2] \; x[4] \; - \; kcr \; kd[2] \; x[4] \; - \; kcr
                               kd[2] km[2] T[1] T[2] x[4] - kcr kd[2] km[2] T[1] T[2] x[4] -
                               kcr kd[2] km[2] T[2] T[3] x[4] + kcr kd[1] km[1] T[2] x[4]^2 +
                               kcr kd[2] km[2] T[2] x[4]^2 + \sqrt{-4 kd[2] km[2] (kcr kd[1] km[1] T[2] x[4] + \sqrt{-4 kd[2] km[2] (kcr kd[1] km[1] T[2] x[4] + \sqrt{-4 kd[2] km[2] (kcr kd[1] km[1] T[2] x[4] + \sqrt{-4 kd[2] km[2] (kcr kd[1] km[1] T[2] x[4] + \sqrt{-4 kd[2] km[2] (kcr kd[1] km[1] T[2] x[4] + \sqrt{-4 kd[2] km[2] (kcr kd[1] km[1] T[2] x[4] + \sqrt{-4 kd[2] km[2] (kcr kd[1] km[1] x[4] + \sqrt{-4 kd[2] km[2] (kcr kd[1] km[2] km[2] (kcr kd[1] km[2] km[2] km[2] (kcr kd[2] km[2] km[2
                                                                     kd[2] km[2] T[1] (-T[3] + x[4])) (km[2]^2 T[1] (-T[3] + x[4]) +
                                                                     x[4]^{2}(-kcr^{2}T[2]^{2}+kcrT[2](km[1]+T[1]-T[2]+T[3]-x[4])+
                                                                                       T[1] (T[2] - T[3] + x[4]) + km[2] x[4] (kcr T[2])
                                                                                              (km[1] + T[1] + T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4])) +
                                                   (kcr\;kd[\,1\,]\;km[\,1\,]\;T[\,2\,]\;x[\,4\,]\;\;(km[\,2\,]\;+x[\,4\,]\;)\;+kd[\,2\,]\;km[\,2\,]
                                                                            (2\;km\,[\,2\,]\;T\,[\,1\,]\;\;(-\,T\,[\,3\,]\;+\,x\,[\,4\,]\;)\;+\,x\,[\,4\,]\;\;(kcr\;T\,[\,2\,]\;\;(km\,[\,1\,]\;+\,T\,[\,1\,]\;+\,x\,[\,4\,]\;)
                                                                                                                            T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4])))^{2}
                    (-2 \text{ kd}[1] \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2]^2 \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] +
                               2 kd[1] kd[2] km[2]^2 T[1] x[4] - 2 kd[2]^2 km[2]^2 T[1] x[4] +
                               kcr kd[1]^2 km[1] km[2] T[2] x[4] - kcr kd[1] kd[2] km[1] km[2] T[2] x[4] +
                               kd[1] \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] + kcr \ kd[1] \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ T[1] \ T[2] \ x[4] - kcr \ kd[2] \ km[2] \ x[4] - kcr \ kd[2] \ x[4] \ x[4] - kcr \ kd[2] \ x[4] 
                               2 kd[1] kd[2] km[2] T[1] T[3] x[4] +
                               kcr kd[1] kd[2] km[2] T[2] T[3] x[4] + 2 kd[1] kd[2] km[2] T[1] x[4]^2 +
                               kcr kd[1]^2 km[1] T[2] x[4]^2 - kcr kd[1] kd[2] km[2] T[2] x[4]^2 -
                               kd[1] \sqrt{-4 kd[2] km[2] (kcr kd[1] km[1] T[2] x[4] +
                                                                           kd[2] km[2] T[1] (-T[3] + x[4])) (km[2]^2 T[1] (-T[3] + x[4]) +
                                                                           x[4]^{2}(-kcr^{2}T[2]^{2}+kcrT[2](km[1]+T[1]-T[2]+T[3]-x[4])+
                                                                                              T[1] (T[2] - T[3] + x[4])) + km[2] x[4] (kcr T[2])
                                                                                                      (km[1] + T[1] + T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4])) +
```

```
(kcr kd[1] km[1] T[2] x[4] (km[2] + x[4]) + kd[2] km[2]
                      (2 km[2] T[1] (-T[3] + x[4]) + x[4] (kcr T[2] (km[1] + T[1] +
                                 T[3] - x[4]) + T[1] (T[2] - 2T[3] + 2x[4]))))^{2}))))
(2 kd[2] km[2] (kcr kd[1] km[1] T[2] x[4] + kd[2] km[2]
       1 \mid (-T \mid 3 \mid + x \mid 4 \mid))
```

Here we get the second derivative of the inverse function:

```
ddfinverse = D[finverse, {x[4], 2}];
```

Simplify[D[finversex7, {x[4], 2}]]

## Simplify[ddfinverse]

\$Aborted

If we don't substitue  $T_4$  only consider relationship between  $x_4$  and  $x_7$ . Then we will have ts3Sol[[2]] as the inverse function of solution  $x_4$ .

```
t3Sol[[2]]
```

```
finversex7 =
   (2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] - 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \times [4] - \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2] \text{ T}[2] \times [4] -
       kcr kd[2] km[1] km[2] T[2] x[4] - kd[2] km[2] T[1] T[2] x[4] -
       kcr kd[2] km[2] T[1] T[2] x[4] + 2 kd[2] km[2] T[1] T[3] x[4] -
       kcr kd[2] km[2] T[2] T[3] x[4] - 2 kd[2] km[2] T[1] x[4]^2 -
       kcr kd[1] km[1] T[2] x[4]^2 + kcr kd[2] km[2] T[2] x[4]^2 +
       \sqrt{\left(-2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ T}[3] + 2 \text{ kd}[2] \text{ km}[2]^2 \text{ T}[1] \text{ x}[4] + \text{kcr} \text{ kd}[1] \text{ km}[1] \text{ km}[2]}
                 T[2] \times [4] + kcr kd[2] km[1] km[2] T[2] \times [4] + kd[2] km[2] T[1] T[2] \times [4] +
                kcr kd[2] km[2] T[1] T[2] x[4] - 2 kd[2] km[2] T[1] T[3] x[4] +
                kcr kd[2] km[2] T[2] T[3] x[4] + 2 kd[2] km[2] T[1] x[4]^2 +
                kcr kd[1] km[1] T[2] x[4]^2 - kcr kd[2] km[2] T[2] x[4]^2
            4 \left(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
                kcr kd[1] kd[2] km[1] km[2] T[2] x[4]) (-km[2]^2 T[1] T[3] +
                km[2]^2T[1]x[4] + kcr km[1]km[2]T[2]x[4] + km[2]T[1]T[2]x[4] +
                kcr km[2] T[1] T[2] x[4] - 2 km[2] T[1] T[3] x[4] + kcr km[2] T[2] T[3]
                 x[4] + 2 km[2] T[1] x[4]^{2} + kcr km[1] T[2] x[4]^{2} - kcr km[2] T[2] x[4]^{2} +
                T[1] T[2] x[4]^2 + kcr T[1] T[2] x[4]^2 - kcr T[2]^2 x[4]^2 - kcr^2 T[2]^2 x[4]^2 -
                T[1] T[3] x[4]^2 + kcr T[2] T[3] x[4]^2 + T[1] x[4]^3 - kcr T[2] x[4]^3)))
    (2(-kd[2]^2 km[2]^2 T[1] T[3] + kd[2]^2 km[2]^2 T[1] x[4] +
          kcr kd[1] kd[2] km[1] km[2] T[2] x[4]);
```