

Minimal Constraint Subsets Detected for differential trail in Table 10 DDH21+

the 0 th Minimal Constraint set is:

$$\begin{aligned}y^1_{1,1} + x^2_{2,5} + k_{15} &= 0 \\y^1_{1,1} + y^1_{1,11} + x^2_{2,13} + k_{15} &= 0 \\y^1_{1,3} + y^1_{1,9} + [y^1_{1,12}] + [x^2_{2,3}] + k_{13} &= 0 \\y^1_{1,3} + y^1_{1,9} + x^2_{2,15} + k_{13} &= 0 \\[y^1_{1,4}] + y^1_{1,11} + [x^2_{2,9}] + k_{10} &= 0 \\y^2_{2,0} + y^2_{2,10} + y^2_{2,13} + x^3_{3,0} + k_1 &= 0 \\y^2_{2,0} + y^2_{2,10} + x^3_{3,12} + k_1 &= 0 \\y^2_{2,2} + [y^2_{2,8}] + y^2_{2,15} + [x^3_{3,2}] + k_0 &= 0 \\y^2_{2,2} + x^3_{3,6} + k_0 &= 0 \\y^2_{2,5} + [y^2_{2,8}] + [x^3_{3,10}] + k_6 &= 0 \\y^3_{3,0} + [y^3_{3,10}] + [x^4_{4,12}] + k_{15} &= 0 \\y^3_{3,3} + y^3_{3,9} + y^3_{3,12} + x^4_{4,3} + k_{14} &= 0 \\y^3_{3,3} + x^4_{4,7} + k_{14} &= 0 \\y^3_{3,6} + y^3_{3,9} + x^4_{4,11} + k_{10} &= 0 \\[y^4_{4,0}] + y^4_{4,10} + [y^4_{4,13}] + x^5_{5,0} + k_7 &= 0 \\y^4_{4,1} + x^5_{5,5} + k_3 &= 0 \\y^4_{4,1} + y^4_{4,11} + x^5_{5,13} + k_3 &= 0 \\y^4_{4,3} + x^5_{5,7} + k_6 &= 0 \\y^4_{4,7} + y^4_{4,10} + x^5_{5,8} + k_5 &= 0 \\y^5_{5,0} + y^5_{5,10} + y^5_{5,13} + x^6_{6,0} + k_{11} &= 0 \\[y^5_{5,2}] + y^5_{5,8} + [y^5_{5,15}] + x^6_{6,2} + k_{15} &= 0 \\[y^5_{5,2}] + y^5_{5,8} + [x^6_{6,14}] + k_{15} &= 0 \\y^5_{5,3} + y^5_{5,9} + [y^5_{5,12}] + [x^6_{6,3}] + k_{12} &= 0 \\y^5_{5,3} + y^5_{5,9} + x^6_{6,15} + k_{12} &= 0 \\y^5_{5,5} + y^5_{5,8} + x^6_{6,10} + k_{10} &= 0 \\y^5_{5,7} + y^5_{5,10} + x^6_{6,8} + k_{14} &= 0 \\y^6_{6,0} + y^6_{6,10} + x^7_{7,12} + k_3 &= 0 \\y^6_{6,2} + y^6_{6,8} + y^6_{6,15} + x^7_{7,2} + k_7 &= 0 \\[y^6_{6,3}] + [y^6_{6,9}] + x^7_{7,15} + k_4 &= 0 \\y^7_{7,0} + [y^7_{7,10}] + [y^7_{7,13}] + x^8_{8,0} + k_{13} &= 0 \\y^7_{7,0} + x^8_{8,4} + k_{13} &= 0 \\y^7_{7,2} + y^7_{7,8} + y^7_{7,15} + x^8_{8,2} + k_{11} &= 0 \\y^7_{7,2} + x^8_{8,6} + k_{11} &= 0 \\y^7_{7,2} + y^7_{7,8} + x^8_{8,14} + k_{11} &= 0 \\y^7_{7,3} + y^7_{7,9} + y^7_{7,12} + x^8_{8,3} + k_{10} &= 0 \\y^7_{7,3} + y^7_{7,9} + x^8_{8,15} + k_{10} &= 0 \\[y^7_{7,7}] + [y^7_{7,10}] + x^8_{8,8} + k_{12} &= 0 \\y^8_{8,0} + x^9_{9,4} + k_5 &= 0 \\y^8_{8,1} + y^8_{8,11} + y^8_{8,14} + x^9_{9,1} + k_6 &= 0 \\y^8_{8,1} + x^9_{9,5} + k_6 &= 0 \\y^8_{8,2} + y^8_{8,8} + y^8_{8,15} + x^9_{9,2} + k_3 &= 0\end{aligned}$$

$$\begin{aligned}
&y^8_3 + y^8_9 + x^9_{15} + k_2 = 0 \\
&y^8_4 + y^8_{11} + x^9_9 + k_7 = 0 \\
&y^8_6 + y^8_9 + x^9_{11} + k_1 = 0 \\
&y^9_1 + x^{10}_5 + k_{12} = 0 \\
&y^9_2 + y^9_8 + y^9_{15} + x^{10}_2 + k_{13} = 0 \\
&[y^9_3] + x^{10}_7 + k_8 = 0 \\
&[y^9_3] + y^9_9 + x^{10}_{15} + k_8 = 0 \\
&y^9_4 + y^9_{11} + x^{10}_9 + k_{11} = 0 \\
&y^9_5 + y^9_8 + x^{10}_{10} + k_9 = 0 \\
&y^{10}_2 + y^{10}_8 + y^{10}_{15} + x^{11}_2 + k_5 = 0 \\
&y^{10}_3 + x^{11}_7 + k_0 = 0 \\
&y^{10}_3 + y^{10}_9 + x^{11}_{15} + k_0 = 0 \\
&y^{10}_5 + y^{10}_8 + x^{11}_{10} + k_1 = 0 \\
&y^{10}_7 + y^{10}_{10} + x^{11}_8 + k_2 = 0 \\
&y^{11}_2 + y^{11}_8 + y^{11}_{15} + x^{12}_2 + k_{14} = 0 \\
&y^{11}_7 + y^{11}_{10} + [x^{12}_8] + k_8 = 0 \\
&y^{12}_2 + [y^{12}_8] + [x^{13}_{14}] + k_6 = 0 \\
&S(x^2_5) + y^2_5 = 0 \\
&S(x^2_{13}) + y^2_{13} = 0 \\
&S(x^2_{15}) + y^2_{15} = 0 \\
&S(x^3_0) + y^3_0 = 0 \\
&S(x^3_6) + y^3_6 = 0 \\
&S(x^3_{12}) + y^3_{12} = 0 \\
&S(x^4_3) + y^4_3 = 0 \\
&S(x^4_7) + y^4_7 = 0 \\
&S(x^4_{11}) + y^4_{11} = 0 \\
&S(x^5_0) + y^5_0 = 0 \\
&S(x^5_5) + y^5_5 = 0 \\
&S(x^5_7) + y^5_7 = 0 \\
&S(x^5_8) + y^5_8 = 0 \\
&S(x^5_{13}) + y^5_{13} = 0 \\
&S(x^6_0) + y^6_0 = 0 \\
&S(x^6_2) + y^6_2 = 0 \\
&S(x^6_8) + y^6_8 = 0 \\
&S(x^6_{10}) + y^6_{10} = 0 \\
&S(x^6_{15}) + y^6_{15} = 0 \\
&S(x^7_2) + y^7_2 = 0 \\
&S(x^7_{12}) + y^7_{12} = 0 \\
&S(x^7_{15}) + y^7_{15} = 0 \\
&S(x^8_0) + y^8_0 = 0 \\
&S(x^8_2) + y^8_2 = 0 \\
&S(x^8_3) + y^8_3 = 0 \\
&S(x^8_4) + y^8_4 = 0 \\
&S(x^8_6) + y^8_6 = 0
\end{aligned}$$

$$\begin{aligned}
S(x^{8_8}) + y^{8_8} &= 0 \\
S(x^{8_{14}}) + y^{8_{14}} &= 0 \\
S(x^{8_{15}}) + y^{8_{15}} &= 0 \\
S(x^{9_1}) + y^{9_1} &= 0 \\
S(x^{9_2}) + y^{9_2} &= 0 \\
S(x^{9_4}) + y^{9_4} &= 0 \\
S(x^{9_5}) + y^{9_5} &= 0 \\
S(x^{9_9}) + y^{9_9} &= 0 \\
S(x^{9_{11}}) + y^{9_{11}} &= 0 \\
S(x^{9_{15}}) + y^{9_{15}} &= 0 \\
S(x^{10_2}) + y^{10_2} &= 0 \\
S(x^{10_5}) + y^{10_5} &= 0 \\
S(x^{10_7}) + y^{10_7} &= 0 \\
S(x^{10_9}) + y^{10_9} &= 0 \\
S(x^{10_{10}}) + y^{10_{10}} &= 0 \\
S(x^{10_{15}}) + y^{10_{15}} &= 0 \\
S(x^{11_2}) + y^{11_2} &= 0 \\
S(x^{11_7}) + y^{11_7} &= 0 \\
S(x^{11_8}) + y^{11_8} &= 0 \\
S(x^{11_{10}}) + y^{11_{10}} &= 0 \\
S(x^{11_{15}}) + y^{11_{15}} &= 0 \\
S(x^{12_2}) + y^{12_2} &= 0
\end{aligned}$$

the 1 th Minimal Constraint set is:

$$\begin{aligned}
y^{1_1} + x^{2_5} + k_{15} &= 0 \\
y^{1_1} + y^{1_{11}} + x^{2_{13}} + k_{15} &= 0 \\
[y^{1_4}] + y^{1_{11}} + [x^{2_9}] + k_{10} &= 0 \\
y^{2_0} + y^{2_{10}} + y^{2_{13}} + x^{3_0} + k_1 &= 0 \\
y^{2_0} + y^{2_{10}} + x^{3_{12}} + k_1 &= 0 \\
y^{2_5} + [y^{2_8}] + [x^{3_{10}}] + k_6 &= 0 \\
y^{3_0} + [y^{3_{10}}] + [x^{4_{12}}] + k_{15} &= 0 \\
y^{3_1} + [y^{3_{11}}] + [y^{3_{14}}] + x^{4_1} + k_{11} &= 0 \\
y^{3_1} + x^{4_5} + k_{11} &= 0 \\
y^{3_3} + y^{3_9} + y^{3_{12}} + x^{4_3} + k_{14} &= 0 \\
y^{3_3} + y^{3_9} + x^{4_{15}} + k_{14} &= 0 \\
y^{4_1} + x^{5_5} + k_3 &= 0 \\
[y^{4_2}] + y^{4_8} + y^{4_{15}} + [x^{5_2}] + k_1 &= 0 \\
y^{4_3} + [y^{4_9}] + [x^{5_{15}}] + k_6 &= 0 \\
y^{4_5} + y^{4_8} + x^{5_{10}} + k_4 &= 0 \\
y^{5_0} + x^{6_4} + k_{11} &= 0 \\
y^{5_0} + y^{5_{10}} + x^{6_{12}} + k_{11} &= 0 \\
[y^{5_2}] + y^{5_8} + [x^{6_{14}}] + k_{15} &= 0 \\
y^{5_3} + y^{5_9} + [y^{5_{12}}] + [x^{6_3}] + k_{12} &= 0 \\
y^{5_3} + y^{5_9} + x^{6_{15}} + k_{12} &= 0 \\
y^{5_5} + y^{5_8} + x^{6_{10}} + k_{10} &= 0
\end{aligned}$$

$$\begin{aligned}
&y^6_0 + x^7_4 + k_3 = 0 \\
&y^6_0 + y^6_{10} + x^7_{12} + k_3 = 0 \\
&[y^6_1] + y^6_{11} + [y^6_{14}] + x^7_1 + k_5 = 0 \\
&y^6_2 + y^6_8 + y^6_{15} + x^7_2 + k_7 = 0 \\
&y^6_2 + y^6_8 + x^7_{14} + k_7 = 0 \\
&[y^6_3] + [y^6_9] + y^6_{12} + x^7_3 + k_4 = 0 \\
&[y^6_3] + [y^6_9] + x^7_{15} + k_4 = 0 \\
&y^6_4 + y^6_{11} + x^7_9 + k_1 = 0 \\
&y^7_0 + [y^7_{10}] + [y^7_{13}] + x^8_0 + k_{13} = 0 \\
&y^7_0 + x^8_4 + k_{13} = 0 \\
&y^7_1 + y^7_{11} + y^7_{14} + x^8_1 + k_{14} = 0 \\
&y^7_2 + y^7_8 + y^7_{15} + x^8_2 + k_{11} = 0 \\
&y^7_2 + x^8_6 + k_{11} = 0 \\
&y^7_2 + y^7_8 + x^8_{14} + k_{11} = 0 \\
&y^7_3 + y^7_9 + y^7_{12} + x^8_3 + k_{10} = 0 \\
&y^7_4 + y^7_{11} + x^8_9 + k_{15} = 0 \\
&y^8_0 + x^9_4 + k_5 = 0 \\
&y^8_1 + y^8_{11} + y^8_{14} + x^9_1 + k_6 = 0 \\
&y^8_2 + x^9_6 + k_3 = 0 \\
&y^8_3 + x^9_7 + k_2 = 0 \\
&y^8_4 + y^8_{11} + x^9_9 + k_7 = 0 \\
&y^8_6 + y^8_9 + x^9_{11} + k_1 = 0 \\
&y^9_0 + x^{10}_4 + k_{14} = 0 \\
&y^9_0 + y^9_{10} + x^{10}_{12} + k_{14} = 0 \\
&y^9_1 + x^{10}_5 + k_{12} = 0 \\
&y^9_4 + y^9_{11} + x^{10}_9 + k_{11} = 0 \\
&y^9_6 + y^9_9 + x^{10}_{11} + k_{15} = 0 \\
&y^9_7 + y^9_{10} + x^{10}_8 + k_{10} = 0 \\
&y^{10}_3 + y^{10}_9 + y^{10}_{12} + x^{11}_3 + k_0 = 0 \\
&y^{10}_3 + x^{11}_7 + k_0 = 0 \\
&y^{10}_4 + y^{10}_{11} + x^{11}_9 + k_3 = 0 \\
&y^{10}_5 + y^{10}_8 + x^{11}_{10} + k_1 = 0 \\
&y^{11}_3 + y^{11}_9 + x^{12}_{15} + k_9 = 0 \\
&y^{11}_7 + y^{11}_{10} + [x^{12}_8] + k_8 = 0 \\
&y^{12}_2 + [y^{12}_8] + y^{12}_{15} + [x^{13}_2] + k_6 = 0 \\
&y^{12}_2 + [y^{12}_8] + [x^{13}_{14}] + k_6 = 0 \\
&S(x^2_5) + y^2_5 = 0 \\
&S(x^2_{13}) + y^2_{13} = 0 \\
&S(x^3_0) + y^3_0 = 0 \\
&S(x^3_{12}) + y^3_{12} = 0 \\
&S(x^4_1) + y^4_1 = 0 \\
&S(x^4_3) + y^4_3 = 0 \\
&S(x^4_5) + y^4_5 = 0 \\
&S(x^4_{15}) + y^4_{15} = 0
\end{aligned}$$

$$\begin{aligned}
&S(x^5_5) + y^5_5 = 0 \\
&S(x^5_{10}) + y^5_{10} = 0 \\
&S(x^6_4) + y^6_4 = 0 \\
&S(x^6_{10}) + y^6_{10} = 0 \\
&S(x^6_{12}) + y^6_{12} = 0 \\
&S(x^6_{15}) + y^6_{15} = 0 \\
&S(x^7_1) + y^7_1 = 0 \\
&S(x^7_2) + y^7_2 = 0 \\
&S(x^7_3) + y^7_3 = 0 \\
&S(x^7_4) + y^7_4 = 0 \\
&S(x^7_9) + y^7_9 = 0 \\
&S(x^7_{12}) + y^7_{12} = 0 \\
&S(x^7_{14}) + y^7_{14} = 0 \\
&S(x^7_{15}) + y^7_{15} = 0 \\
&S(x^8_0) + y^8_0 = 0 \\
&S(x^8_1) + y^8_1 = 0 \\
&S(x^8_2) + y^8_2 = 0 \\
&S(x^8_3) + y^8_3 = 0 \\
&S(x^8_4) + y^8_4 = 0 \\
&S(x^8_6) + y^8_6 = 0 \\
&S(x^8_9) + y^8_9 = 0 \\
&S(x^8_{14}) + y^8_{14} = 0 \\
&S(x^9_1) + y^9_1 = 0 \\
&S(x^9_4) + y^9_4 = 0 \\
&S(x^9_6) + y^9_6 = 0 \\
&S(x^9_7) + y^9_7 = 0 \\
&S(x^9_9) + y^9_9 = 0 \\
&S(x^9_{11}) + y^9_{11} = 0 \\
&S(x^{10}_4) + y^{10}_4 = 0 \\
&S(x^{10}_5) + y^{10}_5 = 0 \\
&S(x^{10}_8) + y^{10}_8 = 0 \\
&S(x^{10}_9) + y^{10}_9 = 0 \\
&S(x^{10}_{11}) + y^{10}_{11} = 0 \\
&S(x^{10}_{12}) + y^{10}_{12} = 0 \\
&S(x^{11}_3) + y^{11}_3 = 0 \\
&S(x^{11}_7) + y^{11}_7 = 0 \\
&S(x^{11}_9) + y^{11}_9 = 0 \\
&S(x^{11}_{10}) + y^{11}_{10} = 0 \\
&S(x^{12}_{15}) + y^{12}_{15} = 0
\end{aligned}$$

the 2 th Minimal Constraint set is:

$$\begin{aligned}
&[y^0_0] + y^0_{10} + [y^0_{13}] + x^1_0 + k_0 = 0 \\
&[y^0_0] + y^0_{10} + [x^1_{12}] + k_0 = 0 \\
&y^1_0 + y^1_{10} + x^2_{12} + k_9 = 0 \\
&y^1_1 + x^2_5 + k_{15} = 0
\end{aligned}$$

$$\begin{aligned}
&y^{1_1} + y^{1_{11}} + x^{2_{13}} + k_{15} = 0 \\
&y^{1_3} + y^{1_9} + [y^{1_{12}}] + [x^{2_3}] + k_{13} = 0 \\
&y^{1_3} + y^{1_9} + x^{2_{15}} + k_{13} = 0 \\
&[y^{1_4}] + y^{1_{11}} + [x^{2_9}] + k_{10} = 0 \\
&[y^{1_7}] + y^{1_{10}} + [x^{2_8}] + k_{11} = 0 \\
&y^{2_0} + y^{2_{10}} + y^{2_{13}} + x^{3_0} + k_1 = 0 \\
&y^{2_0} + y^{2_{10}} + x^{3_{12}} + k_1 = 0 \\
&y^{2_2} + [y^{2_8}] + y^{2_{15}} + [x^{3_2}] + k_0 = 0 \\
&y^{2_2} + x^{3_6} + k_0 = 0 \\
&[y^{2_3}] + [y^{2_9}] + y^{2_{12}} + x^{3_3} + k_5 = 0 \\
&y^{2_5} + [y^{2_8}] + [x^{3_{10}}] + k_6 = 0 \\
&y^{3_0} + [y^{3_{10}}] + [x^{4_{12}}] + k_{15} = 0 \\
&y^{3_3} + y^{3_9} + y^{3_{12}} + x^{4_3} + k_{14} = 0 \\
&y^{3_6} + y^{3_9} + x^{4_{11}} + k_{10} = 0 \\
&y^{4_1} + x^{5_5} + k_3 = 0 \\
&y^{4_1} + y^{4_{11}} + x^{5_{13}} + k_3 = 0 \\
&y^{4_3} + [y^{4_9}] + [x^{5_{15}}] + k_6 = 0 \\
&y^{5_0} + y^{5_{10}} + y^{5_{13}} + x^{6_0} + k_{11} = 0 \\
&y^{5_0} + y^{5_{10}} + x^{6_{12}} + k_{11} = 0 \\
&[y^{5_1}] + [y^{5_{11}}] + x^{6_{13}} + k_{13} = 0 \\
&[y^{5_2}] + y^{5_8} + [x^{6_{14}}] + k_{15} = 0 \\
&y^{5_3} + y^{5_9} + [y^{5_{12}}] + [x^{6_3}] + k_{12} = 0 \\
&y^{5_3} + x^{6_7} + k_{12} = 0 \\
&y^{5_5} + y^{5_8} + x^{6_{10}} + k_{10} = 0 \\
&[y^{5_6}] + y^{5_9} + x^{6_{11}} + k_8 = 0 \\
&y^{6_0} + y^{6_{10}} + y^{6_{13}} + x^{7_0} + k_3 = 0 \\
&y^{6_0} + x^{7_4} + k_3 = 0 \\
&y^{6_0} + y^{6_{10}} + x^{7_{12}} + k_3 = 0 \\
&[y^{6_1}] + y^{6_{11}} + [y^{6_{14}}] + x^{7_1} + k_5 = 0 \\
&[y^{6_3}] + [y^{6_9}] + y^{6_{12}} + x^{7_3} + k_4 = 0 \\
&[y^{6_3}] + [y^{6_9}] + x^{7_{15}} + k_4 = 0 \\
&[y^{6_6}] + [y^{6_9}] + x^{7_{11}} + k_0 = 0 \\
&y^{6_7} + y^{6_{10}} + x^{7_8} + k_6 = 0 \\
&y^{7_0} + [y^{7_{10}}] + [y^{7_{13}}] + x^{8_0} + k_{13} = 0 \\
&y^{7_1} + x^{8_5} + k_{14} = 0 \\
&y^{7_2} + y^{7_8} + y^{7_{15}} + x^{8_2} + k_{11} = 0 \\
&y^{7_2} + x^{8_6} + k_{11} = 0 \\
&y^{7_3} + y^{7_9} + y^{7_{12}} + x^{8_3} + k_{10} = 0 \\
&y^{7_3} + x^{8_7} + k_{10} = 0 \\
&y^{7_3} + y^{7_9} + x^{8_{15}} + k_{10} = 0 \\
&y^{7_4} + y^{7_{11}} + x^{8_9} + k_{15} = 0 \\
&[y^{7_7}] + [y^{7_{10}}] + x^{8_8} + k_{12} = 0 \\
&y^{8_0} + y^{8_{10}} + x^{9_{12}} + k_5 = 0 \\
&y^{8_2} + y^{8_8} + y^{8_{15}} + x^{9_2} + k_3 = 0
\end{aligned}$$

$$\begin{aligned}
&y^8_2 + x^9_6 + k_3 = 0 \\
&y^8_2 + y^8_8 + x^9_{14} + k_3 = 0 \\
&y^8_3 + x^9_7 + k_2 = 0 \\
&y^8_5 + y^8_8 + x^9_{10} + k_0 = 0 \\
&y^8_6 + y^8_9 + x^9_{11} + k_1 = 0 \\
&y^8_7 + y^8_{10} + x^9_8 + k_4 = 0 \\
&y^9_1 + y^9_{11} + y^9_{14} + x^{10}_1 + k_{12} = 0 \\
&y^9_1 + x^{10}_5 + k_{12} = 0 \\
&y^9_2 + y^9_8 + x^{10}_{14} + k_{13} = 0 \\
&[y^9_3] + y^9_9 + y^9_{12} + x^{10}_3 + k_8 = 0 \\
&y^9_6 + y^9_9 + x^{10}_{11} + k_{15} = 0 \\
&y^9_7 + y^9_{10} + x^{10}_8 + k_{10} = 0 \\
&y^{10}_1 + y^{10}_{11} + y^{10}_{14} + x^{11}_1 + k_4 = 0 \\
&y^{10}_3 + x^{11}_7 + k_0 = 0 \\
&y^{10}_5 + y^{10}_8 + x^{11}_{10} + k_1 = 0 \\
&y^{11}_1 + x^{12}_5 + k_{10} = 0 \\
&y^{11}_7 + y^{11}_{10} + [x^{12}_8] + k_8 = 0 \\
&y^{12}_5 + [y^{12}_8] + [x^{13}_{10}] + k_7 = 0 \\
&S(x^1_0) + y^1_0 = 0 \\
&S(x^2_5) + y^2_5 = 0 \\
&S(x^2_{12}) + y^2_{12} = 0 \\
&S(x^2_{13}) + y^2_{13} = 0 \\
&S(x^2_{15}) + y^2_{15} = 0 \\
&S(x^3_0) + y^3_0 = 0 \\
&S(x^3_3) + y^3_3 = 0 \\
&S(x^3_6) + y^3_6 = 0 \\
&S(x^3_{12}) + y^3_{12} = 0 \\
&S(x^4_3) + y^4_3 = 0 \\
&S(x^4_{11}) + y^4_{11} = 0 \\
&S(x^5_5) + y^5_5 = 0 \\
&S(x^5_{13}) + y^5_{13} = 0 \\
&S(x^6_0) + y^6_0 = 0 \\
&S(x^6_7) + y^6_7 = 0 \\
&S(x^6_{10}) + y^6_{10} = 0 \\
&S(x^6_{11}) + y^6_{11} = 0 \\
&S(x^6_{12}) + y^6_{12} = 0 \\
&S(x^6_{13}) + y^6_{13} = 0 \\
&S(x^7_0) + y^7_0 = 0 \\
&S(x^7_1) + y^7_1 = 0 \\
&S(x^7_3) + y^7_3 = 0 \\
&S(x^7_4) + y^7_4 = 0 \\
&S(x^7_8) + y^7_8 = 0 \\
&S(x^7_{11}) + y^7_{11} = 0 \\
&S(x^7_{12}) + y^7_{12} = 0
\end{aligned}$$

$$S(x^{7_{15}}) + y^{7_{15}} = 0$$

$$S(x^{8_0}) + y^{8_0} = 0$$

$$S(x^{8_2}) + y^{8_2} = 0$$

$$S(x^{8_3}) + y^{8_3} = 0$$

$$S(x^{8_5}) + y^{8_5} = 0$$

$$S(x^{8_6}) + y^{8_6} = 0$$

$$S(x^{8_7}) + y^{8_7} = 0$$

$$S(x^{8_8}) + y^{8_8} = 0$$

$$S(x^{8_9}) + y^{8_9} = 0$$

$$S(x^{8_{15}}) + y^{8_{15}} = 0$$

$$S(x^{9_2}) + y^{9_2} = 0$$

$$S(x^{9_6}) + y^{9_6} = 0$$

$$S(x^{9_7}) + y^{9_7} = 0$$

$$S(x^{9_8}) + y^{9_8} = 0$$

$$S(x^{9_{10}}) + y^{9_{10}} = 0$$

$$S(x^{9_{11}}) + y^{9_{11}} = 0$$

$$S(x^{9_{12}}) + y^{9_{12}} = 0$$

$$S(x^{9_{14}}) + y^{9_{14}} = 0$$

$$S(x^{10_1}) + y^{10_1} = 0$$

$$S(x^{10_3}) + y^{10_3} = 0$$

$$S(x^{10_5}) + y^{10_5} = 0$$

$$S(x^{10_8}) + y^{10_8} = 0$$

$$S(x^{10_{11}}) + y^{10_{11}} = 0$$

$$S(x^{10_{14}}) + y^{10_{14}} = 0$$

$$S(x^{11_1}) + y^{11_1} = 0$$

$$S(x^{11_7}) + y^{11_7} = 0$$

$$S(x^{11_{10}}) + y^{11_{10}} = 0$$

$$S(x^{12_5}) + y^{12_5} = 0$$

the 3 th Minimal Constraint set is:

$$y^{1_1} + x^{2_5} + k_{15} = 0$$

$$y^{1_1} + y^{1_{11}} + x^{2_{13}} + k_{15} = 0$$

$$y^{1_3} + y^{1_9} + [y^{1_{12}}] + [x^{2_3}] + k_{13} = 0$$

$$y^{1_3} + y^{1_9} + x^{2_{15}} + k_{13} = 0$$

$$[y^{1_4}] + y^{1_{11}} + [x^{2_9}] + k_{10} = 0$$

$$y^{2_0} + y^{2_{10}} + y^{2_{13}} + x^{3_0} + k_1 = 0$$

$$y^{2_0} + y^{2_{10}} + x^{3_{12}} + k_1 = 0$$

$$y^{2_2} + [y^{2_8}] + y^{2_{15}} + [x^{3_2}] + k_0 = 0$$

$$y^{2_2} + x^{3_6} + k_0 = 0$$

$$y^{2_5} + [y^{2_8}] + [x^{3_{10}}] + k_6 = 0$$

$$y^{3_0} + [y^{3_{10}}] + [x^{4_{12}}] + k_{15} = 0$$

$$y^{3_3} + y^{3_9} + y^{3_{12}} + x^{4_3} + k_{14} = 0$$

$$y^{3_3} + x^{4_7} + k_{14} = 0$$

$$y^{3_6} + y^{3_9} + x^{4_{11}} + k_{10} = 0$$

$$[y^{4_0}] + y^{4_{10}} + [y^{4_{13}}] + x^{5_0} + k_7 = 0$$

$$\begin{aligned}
&y^4_{1} + x^5_{5} + k_3 = 0 \\
&y^4_{1} + y^4_{11} + x^5_{13} + k_3 = 0 \\
&y^4_{3} + [y^4_{9}] + [y^4_{12}] + x^5_{3} + k_6 = 0 \\
&y^4_{7} + y^4_{10} + x^5_{8} + k_5 = 0 \\
&y^5_{0} + y^5_{10} + y^5_{13} + x^6_{0} + k_{11} = 0 \\
&y^5_{0} + x^6_{4} + k_{11} = 0 \\
&y^5_{0} + y^5_{10} + x^6_{12} + k_{11} = 0 \\
&y^5_{3} + y^5_{9} + x^6_{15} + k_{12} = 0 \\
&y^5_{5} + y^5_{8} + x^6_{10} + k_{10} = 0 \\
&[y^5_{6}] + y^5_{9} + x^6_{11} + k_8 = 0 \\
&y^6_{0} + y^6_{10} + x^7_{12} + k_3 = 0 \\
&y^6_{2} + y^6_{8} + y^6_{15} + x^7_{2} + k_7 = 0 \\
&y^6_{2} + y^6_{8} + x^7_{14} + k_7 = 0 \\
&[y^6_{3}] + [y^6_{9}] + y^6_{12} + x^7_{3} + k_4 = 0 \\
&y^6_{4} + y^6_{11} + x^7_{9} + k_1 = 0 \\
&[y^6_{6}] + [y^6_{9}] + x^7_{11} + k_0 = 0 \\
&y^7_{0} + [y^7_{10}] + [y^7_{13}] + x^8_{0} + k_{13} = 0 \\
&y^7_{0} + x^8_{4} + k_{13} = 0 \\
&y^7_{1} + y^7_{11} + y^7_{14} + x^8_{1} + k_{14} = 0 \\
&y^7_{1} + x^8_{5} + k_{14} = 0 \\
&y^7_{2} + y^7_{8} + x^8_{14} + k_{11} = 0 \\
&y^7_{3} + y^7_{9} + y^7_{12} + x^8_{3} + k_{10} = 0 \\
&[y^7_{5}] + y^7_{8} + x^8_{10} + k_8 = 0 \\
&[y^7_{7}] + [y^7_{10}] + x^8_{8} + k_{12} = 0 \\
&y^8_{0} + y^8_{10} + x^9_{12} + k_5 = 0 \\
&y^8_{1} + y^8_{11} + y^8_{14} + x^9_{1} + k_6 = 0 \\
&y^8_{3} + x^9_{7} + k_2 = 0 \\
&y^8_{4} + y^8_{11} + x^9_{9} + k_7 = 0 \\
&y^8_{5} + y^8_{8} + x^9_{10} + k_0 = 0 \\
&y^9_{1} + x^{10}_{5} + k_{12} = 0 \\
&[y^9_{3}] + y^9_{9} + y^9_{12} + x^{10}_{3} + k_8 = 0 \\
&y^9_{7} + y^9_{10} + x^{10}_{8} + k_{10} = 0 \\
&y^{10}_{3} + x^{11}_{7} + k_0 = 0 \\
&y^{10}_{5} + y^{10}_{8} + x^{11}_{10} + k_1 = 0 \\
&y^{11}_{7} + y^{11}_{10} + [x^{12}_{8}] + k_8 = 0 \\
&S(x^2_{5}) + y^2_{5} = 0 \\
&S(x^2_{13}) + y^2_{13} = 0 \\
&S(x^2_{15}) + y^2_{15} = 0 \\
&S(x^3_{0}) + y^3_{0} = 0 \\
&S(x^3_{6}) + y^3_{6} = 0 \\
&S(x^3_{12}) + y^3_{12} = 0 \\
&S(x^4_{3}) + y^4_{3} = 0 \\
&S(x^4_{7}) + y^4_{7} = 0 \\
&S(x^4_{11}) + y^4_{11} = 0
\end{aligned}$$

$$\begin{aligned}
S(x^5_0) + y^5_0 &= 0 \\
S(x^5_3) + y^5_3 &= 0 \\
S(x^5_5) + y^5_5 &= 0 \\
S(x^5_8) + y^5_8 &= 0 \\
S(x^5_{13}) + y^5_{13} &= 0 \\
S(x^6_0) + y^6_0 &= 0 \\
S(x^6_4) + y^6_4 &= 0 \\
S(x^6_{10}) + y^6_{10} &= 0 \\
S(x^6_{11}) + y^6_{11} &= 0 \\
S(x^6_{12}) + y^6_{12} &= 0 \\
S(x^6_{15}) + y^6_{15} &= 0 \\
S(x^7_2) + y^7_2 &= 0 \\
S(x^7_3) + y^7_3 &= 0 \\
S(x^7_9) + y^7_9 &= 0 \\
S(x^7_{11}) + y^7_{11} &= 0 \\
S(x^7_{12}) + y^7_{12} &= 0 \\
S(x^7_{14}) + y^7_{14} &= 0 \\
S(x^8_0) + y^8_0 &= 0 \\
S(x^8_1) + y^8_1 &= 0 \\
S(x^8_3) + y^8_3 &= 0 \\
S(x^8_4) + y^8_4 &= 0 \\
S(x^8_5) + y^8_5 &= 0 \\
S(x^8_8) + y^8_8 &= 0 \\
S(x^8_{10}) + y^8_{10} &= 0 \\
S(x^8_{14}) + y^8_{14} &= 0 \\
S(x^9_1) + y^9_1 &= 0 \\
S(x^9_7) + y^9_7 &= 0 \\
S(x^9_9) + y^9_9 &= 0 \\
S(x^9_{10}) + y^9_{10} &= 0 \\
S(x^9_{12}) + y^9_{12} &= 0 \\
S(x^{10}_3) + y^{10}_3 &= 0 \\
S(x^{10}_5) + y^{10}_5 &= 0 \\
S(x^{10}_8) + y^{10}_8 &= 0 \\
S(x^{11}_7) + y^{11}_7 &= 0 \\
S(x^{11}_{10}) + y^{11}_{10} &= 0
\end{aligned}$$

the 4 th Minimal Constraint set is:

$$\begin{aligned}
y^1_{1_1} + x^2_{2_5} + k_{15} &= 0 \\
y^1_{1_1} + y^1_{1_{11}} + x^2_{2_{13}} + k_{15} &= 0 \\
[y^1_{1_4}] + y^1_{1_{11}} + [x^2_{2_9}] + k_{10} &= 0 \\
y^2_{2_0} + y^2_{2_{10}} + y^2_{2_{13}} + x^3_{3_0} + k_1 &= 0 \\
y^2_{2_0} + y^2_{2_{10}} + x^3_{3_{12}} + k_1 &= 0 \\
y^2_{2_5} + [y^2_{2_8}] + [x^3_{3_{10}}] + k_6 &= 0 \\
y^3_{3_0} + [y^3_{3_{10}}] + [x^4_{4_{12}}] + k_{15} &= 0 \\
y^3_{3_1} + [y^3_{3_{11}}] + [y^3_{3_{14}}] + x^4_{4_1} + k_{11} &= 0
\end{aligned}$$

$$\begin{aligned}
&y^3_{3_1} + x^4_{5_1} + k_{11} = 0 \\
&y^3_{3_3} + y^3_{3_9} + y^3_{3_{12}} + x^4_{3_1} + k_{14} = 0 \\
&y^3_{3_3} + y^3_{3_9} + x^4_{15} + k_{14} = 0 \\
&y^4_{4_1} + x^5_{5_5} + k_{3_1} = 0 \\
&[y^4_{4_2}] + y^4_{8_1} + y^4_{15_1} + [x^5_{2_1}] + k_{1_1} = 0 \\
&y^4_{4_3} + [y^4_{9_1}] + [y^4_{12_1}] + x^5_{3_1} + k_{6_1} = 0 \\
&y^4_{4_5} + y^4_{8_1} + x^5_{10_1} + k_{4_1} = 0 \\
&y^5_{5_0} + x^6_{4_1} + k_{11_1} = 0 \\
&y^5_{5_0} + y^5_{10_1} + x^6_{12_1} + k_{11_1} = 0 \\
&[y^5_{2_1}] + y^5_{8_1} + [x^6_{14_1}] + k_{15_1} = 0 \\
&y^5_{5_3} + y^5_{9_1} + [y^5_{12_1}] + [x^6_{3_1}] + k_{12_1} = 0 \\
&y^5_{5_5} + y^5_{8_1} + x^6_{10_1} + k_{10_1} = 0 \\
&[y^5_{6_1}] + y^5_{9_1} + x^6_{11_1} + k_{8_1} = 0 \\
&y^6_{6_0} + x^7_{4_1} + k_{3_1} = 0 \\
&y^6_{6_0} + y^6_{10_1} + x^7_{12_1} + k_{3_1} = 0 \\
&[y^6_{3_1}] + [y^6_{9_1}] + y^6_{12_1} + x^7_{3_1} + k_{4_1} = 0 \\
&y^6_{6_4} + y^6_{11_1} + x^7_{9_1} + k_{1_1} = 0 \\
&[y^6_{6_1}] + [y^6_{9_1}] + x^7_{11_1} + k_{0_1} = 0 \\
&y^7_{7_3} + y^7_{9_1} + y^7_{12_1} + x^8_{3_1} + k_{10_1} = 0 \\
&y^7_{7_4} + y^7_{11_1} + x^8_{9_1} + k_{15_1} = 0 \\
&y^8_{8_3} + y^8_{9_1} + [y^8_{12_1}] + [x^9_{3_1}] + k_{2_1} = 0 \\
&S(x^2_{5_1}) + y^2_{5_1} = 0 \\
&S(x^2_{13_1}) + y^2_{13_1} = 0 \\
&S(x^3_{0_1}) + y^3_{0_1} = 0 \\
&S(x^3_{12_1}) + y^3_{12_1} = 0 \\
&S(x^4_{1_1}) + y^4_{1_1} = 0 \\
&S(x^4_{3_1}) + y^4_{3_1} = 0 \\
&S(x^4_{5_1}) + y^4_{5_1} = 0 \\
&S(x^4_{15_1}) + y^4_{15_1} = 0 \\
&S(x^5_{3_1}) + y^5_{3_1} = 0 \\
&S(x^5_{5_1}) + y^5_{5_1} = 0 \\
&S(x^5_{10_1}) + y^5_{10_1} = 0 \\
&S(x^6_{4_1}) + y^6_{4_1} = 0 \\
&S(x^6_{10_1}) + y^6_{10_1} = 0 \\
&S(x^6_{11_1}) + y^6_{11_1} = 0 \\
&S(x^6_{12_1}) + y^6_{12_1} = 0 \\
&S(x^7_{3_1}) + y^7_{3_1} = 0 \\
&S(x^7_{4_1}) + y^7_{4_1} = 0 \\
&S(x^7_{9_1}) + y^7_{9_1} = 0 \\
&S(x^7_{11_1}) + y^7_{11_1} = 0 \\
&S(x^7_{12_1}) + y^7_{12_1} = 0 \\
&S(x^8_{3_1}) + y^8_{3_1} = 0 \\
&S(x^8_{9_1}) + y^8_{9_1} = 0
\end{aligned}$$

the 5 th Minimal Constraint set is:

$$\begin{aligned}
&[y^{0_0}] + y^{0_{10}} + [y^{0_{13}}] + x^{1_0} + k_0 = 0 \\
&[y^{0_0}] + y^{0_{10}} + [x^{1_{12}}] + k_0 = 0 \\
&y^{1_0} + y^{1_{10}} + x^{2_{12}} + k_9 = 0 \\
&[y^{1_7}] + y^{1_{10}} + [x^{2_8}] + k_{11} = 0 \\
&[y^{2_3}] + [y^{2_9}] + y^{2_{12}} + x^{3_3} + k_5 = 0 \\
&y^{3_3} + x^{4_7} + k_{14} = 0 \\
&[y^{4_0}] + y^{4_{10}} + [x^{5_{12}}] + k_7 = 0 \\
&y^{4_7} + y^{4_{10}} + x^{5_8} + k_5 = 0 \\
&[y^{5_2}] + y^{5_8} + [x^{6_{14}}] + k_{15} = 0 \\
&S(x^{1_0}) + y^{1_0} = 0 \\
&S(x^{2_{12}}) + y^{2_{12}} = 0 \\
&S(x^{3_3}) + y^{3_3} = 0 \\
&S(x^{4_7}) + y^{4_7} = 0 \\
&S(x^{5_8}) + y^{5_8} = 0
\end{aligned}$$

the 6 th Minimal Constraint set is:

$$\begin{aligned}
&[y^{0_0}] + y^{0_{10}} + [y^{0_{13}}] + x^{1_0} + k_0 = 0 \\
&[y^{0_0}] + y^{0_{10}} + [x^{1_{12}}] + k_0 = 0 \\
&y^{0_2} + y^{0_8} + [y^{0_{15}}] + [x^{1_2}] + k_2 = 0 \\
&y^{0_2} + y^{0_8} + x^{1_{14}} + k_2 = 0 \\
&y^{1_0} + y^{1_{10}} + x^{2_{12}} + k_9 = 0 \\
&y^{1_1} + y^{1_{11}} + y^{1_{14}} + x^{2_1} + k_{15} = 0 \\
&y^{1_1} + x^{2_5} + k_{15} = 0 \\
&[y^{1_4}] + y^{1_{11}} + [x^{2_9}] + k_{10} = 0 \\
&[y^{1_7}] + y^{1_{10}} + [x^{2_8}] + k_{11} = 0 \\
&y^{2_1} + x^{3_5} + k_7 = 0 \\
&[y^{2_3}] + [y^{2_9}] + y^{2_{12}} + x^{3_3} + k_5 = 0 \\
&[y^{2_3}] + [y^{2_9}] + x^{3_{15}} + k_5 = 0 \\
&y^{2_5} + [y^{2_8}] + [x^{3_{10}}] + k_6 = 0 \\
&[y^{3_2}] + y^{3_8} + y^{3_{15}} + [x^{4_2}] + k_9 = 0 \\
&y^{3_3} + x^{4_7} + k_{14} = 0 \\
&y^{3_5} + y^{3_8} + x^{4_{10}} + k_{12} = 0 \\
&y^{4_7} + y^{4_{10}} + x^{5_8} + k_5 = 0 \\
&[y^{5_2}] + y^{5_8} + [x^{6_{14}}] + k_{15} = 0 \\
&S(x^{1_0}) + y^{1_0} = 0 \\
&S(x^{1_{14}}) + y^{1_{14}} = 0 \\
&S(x^{2_1}) + y^{2_1} = 0 \\
&S(x^{2_5}) + y^{2_5} = 0 \\
&S(x^{2_{12}}) + y^{2_{12}} = 0 \\
&S(x^{3_3}) + y^{3_3} = 0 \\
&S(x^{3_5}) + y^{3_5} = 0 \\
&S(x^{3_{15}}) + y^{3_{15}} = 0 \\
&S(x^{4_7}) + y^{4_7} = 0 \\
&S(x^{4_{10}}) + y^{4_{10}} = 0 \\
&S(x^{5_8}) + y^{5_8} = 0
\end{aligned}$$

the 7 th Minimal Constraint set is:

$$y^{0_2} + y^{0_8} + [y^{0_{15}}] + [x^{1_2}] + k_2 = 0$$

$$y^{0_2} + y^{0_8} + x^{1_{14}} + k_2 = 0$$

$$[y^{0_3}] + [y^{0_9}] + x^{1_{15}} + k_3 = 0$$

$$y^{1_0} + x^{2_4} + k_9 = 0$$

$$y^{1_0} + y^{1_{10}} + x^{2_{12}} + k_9 = 0$$

$$y^{1_1} + y^{1_{11}} + y^{1_{14}} + x^{2_1} + k_{15} = 0$$

$$y^{1_1} + x^{2_5} + k_{15} = 0$$

$$[y^{1_2}] + y^{1_8} + y^{1_{15}} + x^{2_2} + k_8 = 0$$

$$[y^{1_2}] + y^{1_8} + x^{2_{14}} + k_8 = 0$$

$$y^{1_3} + y^{1_9} + [y^{1_{12}}] + [x^{2_3}] + k_{13} = 0$$

$$y^{1_3} + y^{1_9} + x^{2_{15}} + k_{13} = 0$$

$$[y^{1_4}] + y^{1_{11}} + [x^{2_9}] + k_{10} = 0$$

$$[y^{1_7}] + y^{1_{10}} + [x^{2_8}] + k_{11} = 0$$

$$y^{2_1} + y^{2_{11}} + y^{2_{14}} + x^{3_1} + k_7 = 0$$

$$y^{2_2} + [y^{2_8}] + y^{2_{15}} + [x^{3_2}] + k_0 = 0$$

$$[y^{2_3}] + [y^{2_9}] + y^{2_{12}} + x^{3_3} + k_5 = 0$$

$$y^{2_4} + y^{2_{11}} + x^{3_9} + k_2 = 0$$

$$y^{2_5} + [y^{2_8}] + [x^{3_{10}}] + k_6 = 0$$

$$y^{3_1} + x^{4_5} + k_{11} = 0$$

$$y^{3_3} + y^{3_9} + x^{4_{15}} + k_{14} = 0$$

$$[y^{4_2}] + y^{4_8} + y^{4_{15}} + [x^{5_2}] + k_1 = 0$$

$$y^{4_3} + x^{5_7} + k_6 = 0$$

$$y^{4_3} + [y^{4_9}] + [x^{5_{15}}] + k_6 = 0$$

$$y^{4_5} + y^{4_8} + x^{5_{10}} + k_4 = 0$$

$$y^{5_7} + y^{5_{10}} + x^{6_8} + k_{14} = 0$$

$$[y^{6_5}] + y^{6_8} + [x^{7_{10}}] + k_2 = 0$$

$$S(x^{1_{14}}) + y^{1_{14}} = 0$$

$$S(x^{1_{15}}) + y^{1_{15}} = 0$$

$$S(x^{2_1}) + y^{2_1} = 0$$

$$S(x^{2_2}) + y^{2_2} = 0$$

$$S(x^{2_4}) + y^{2_4} = 0$$

$$S(x^{2_5}) + y^{2_5} = 0$$

$$S(x^{2_{12}}) + y^{2_{12}} = 0$$

$$S(x^{2_{14}}) + y^{2_{14}} = 0$$

$$S(x^{2_{15}}) + y^{2_{15}} = 0$$

$$S(x^{3_1}) + y^{3_1} = 0$$

$$S(x^{3_3}) + y^{3_3} = 0$$

$$S(x^{3_9}) + y^{3_9} = 0$$

$$S(x^{4_5}) + y^{4_5} = 0$$

$$S(x^{4_{15}}) + y^{4_{15}} = 0$$

$$S(x^{5_7}) + y^{5_7} = 0$$

$$S(x^{5_{10}}) + y^{5_{10}} = 0$$

$$S(x^{6_8}) + y^{6_8} = 0$$

the 8 th Minimal Constraint set is:

$$y^{0_2} + y^{0_8} + [y^{0_{15}}] + [x^{1_2}] + k_2 = 0$$

$$y^{0_2} + y^{0_8} + x^{1_{14}} + k_2 = 0$$

$$[y^{0_3}] + [y^{0_9}] + x^{1_{15}} + k_3 = 0$$

$$y^{1_0} + x^{2_4} + k_9 = 0$$

$$y^{1_0} + y^{1_{10}} + x^{2_{12}} + k_9 = 0$$

$$y^{1_1} + y^{1_{11}} + y^{1_{14}} + x^{2_1} + k_{15} = 0$$

$$y^{1_1} + y^{1_{11}} + x^{2_{13}} + k_{15} = 0$$

$$[y^{1_2}] + y^{1_8} + y^{1_{15}} + x^{2_2} + k_8 = 0$$

$$[y^{1_2}] + y^{1_8} + x^{2_{14}} + k_8 = 0$$

$$[y^{1_7}] + y^{1_{10}} + [x^{2_8}] + k_{11} = 0$$

$$y^{2_0} + y^{2_{10}} + y^{2_{13}} + x^{3_0} + k_1 = 0$$

$$y^{2_0} + y^{2_{10}} + x^{3_{12}} + k_1 = 0$$

$$y^{2_1} + y^{2_{11}} + y^{2_{14}} + x^{3_1} + k_7 = 0$$

$$y^{2_2} + x^{3_6} + k_0 = 0$$

$$[y^{2_3}] + [y^{2_9}] + y^{2_{12}} + x^{3_3} + k_5 = 0$$

$$y^{2_4} + y^{2_{11}} + x^{3_9} + k_2 = 0$$

$$y^{3_0} + [y^{3_{10}}] + [x^{4_{12}}] + k_{15} = 0$$

$$y^{3_1} + x^{4_5} + k_{11} = 0$$

$$y^{3_3} + y^{3_9} + y^{3_{12}} + x^{4_3} + k_{14} = 0$$

$$y^{3_3} + x^{4_7} + k_{14} = 0$$

$$y^{3_3} + y^{3_9} + x^{4_{15}} + k_{14} = 0$$

$$y^{3_6} + y^{3_9} + x^{4_{11}} + k_{10} = 0$$

$$[y^{4_0}] + y^{4_{10}} + [y^{4_{13}}] + x^{5_0} + k_7 = 0$$

$$y^{4_1} + x^{5_5} + k_3 = 0$$

$$y^{4_1} + y^{4_{11}} + x^{5_{13}} + k_3 = 0$$

$$[y^{4_2}] + y^{4_8} + y^{4_{15}} + [x^{5_2}] + k_1 = 0$$

$$y^{4_3} + [y^{4_9}] + [x^{5_{15}}] + k_6 = 0$$

$$y^{4_5} + y^{4_8} + x^{5_{10}} + k_4 = 0$$

$$y^{4_7} + y^{4_{10}} + x^{5_8} + k_5 = 0$$

$$y^{5_0} + y^{5_{10}} + y^{5_{13}} + x^{6_0} + k_{11} = 0$$

$$[y^{5_1}] + [y^{5_{11}}] + x^{6_{13}} + k_{13} = 0$$

$$y^{5_5} + y^{5_8} + x^{6_{10}} + k_{10} = 0$$

$$y^{6_0} + y^{6_{10}} + y^{6_{13}} + x^{7_0} + k_3 = 0$$

$$y^{7_0} + [y^{7_{10}}] + [x^{8_{12}}] + k_{13} = 0$$

$$S(x^{1_{14}}) + y^{1_{14}} = 0$$

$$S(x^{1_{15}}) + y^{1_{15}} = 0$$

$$S(x^{2_1}) + y^{2_1} = 0$$

$$S(x^{2_2}) + y^{2_2} = 0$$

$$S(x^{2_4}) + y^{2_4} = 0$$

$$S(x^{2_{12}}) + y^{2_{12}} = 0$$

$$S(x^{2_{13}}) + y^{2_{13}} = 0$$

$$S(x^{2_{14}}) + y^{2_{14}} = 0$$

$$S(x^{3_0}) + y^{3_0} = 0$$

$$\begin{aligned}
S(x^3_1) + y^3_1 &= 0 \\
S(x^3_3) + y^3_3 &= 0 \\
S(x^3_6) + y^3_6 &= 0 \\
S(x^3_9) + y^3_9 &= 0 \\
S(x^3_{12}) + y^3_{12} &= 0 \\
S(x^4_3) + y^4_3 &= 0 \\
S(x^4_5) + y^4_5 &= 0 \\
S(x^4_7) + y^4_7 &= 0 \\
S(x^4_{11}) + y^4_{11} &= 0 \\
S(x^4_{15}) + y^4_{15} &= 0 \\
S(x^5_0) + y^5_0 &= 0 \\
S(x^5_5) + y^5_5 &= 0 \\
S(x^5_8) + y^5_8 &= 0 \\
S(x^5_{10}) + y^5_{10} &= 0 \\
S(x^5_{13}) + y^5_{13} &= 0 \\
S(x^6_0) + y^6_0 &= 0 \\
S(x^6_{10}) + y^6_{10} &= 0 \\
S(x^6_{13}) + y^6_{13} &= 0 \\
S(x^7_0) + y^7_0 &= 0
\end{aligned}$$

the 9 th Minimal Constraint set is:

$$\begin{aligned}
y^4_3 + [y^4_9] + [y^4_{12}] + x^5_3 + k_6 &= 0 \\
y^4_3 + [y^4_9] + [x^5_{15}] + k_6 &= 0 \\
y^5_3 + y^5_9 + [y^5_{12}] + [x^6_3] + k_{12} &= 0 \\
[y^5_6] + y^5_9 + x^6_{11} + k_8 &= 0 \\
[y^6_1] + y^6_{11} + [x^7_{13}] + k_5 &= 0 \\
S(x^5_3) + y^5_3 &= 0 \\
S(x^6_{11}) + y^6_{11} &= 0
\end{aligned}$$

the 10 th Minimal Constraint set is:

$$\begin{aligned}
[y^0_0] + y^0_{10} + [y^0_{13}] + x^1_0 + k_0 &= 0 \\
[y^0_0] + y^0_{10} + [x^1_{12}] + k_0 &= 0 \\
y^1_0 + y^1_{10} + x^2_{12} + k_9 &= 0 \\
y^1_1 + x^2_5 + k_{15} &= 0 \\
y^1_1 + y^1_{11} + x^2_{13} + k_{15} &= 0 \\
y^1_3 + y^1_9 + [y^1_{12}] + [x^2_3] + k_{13} &= 0 \\
y^1_3 + y^1_9 + x^2_{15} + k_{13} &= 0 \\
[y^1_4] + y^1_{11} + [x^2_9] + k_{10} &= 0 \\
[y^1_7] + y^1_{10} + [x^2_8] + k_{11} &= 0 \\
y^2_0 + y^2_{10} + y^2_{13} + x^3_0 + k_1 &= 0 \\
y^2_0 + y^2_{10} + x^3_{12} + k_1 &= 0 \\
y^2_2 + [y^2_8] + y^2_{15} + [x^3_2] + k_0 &= 0 \\
y^2_2 + x^3_6 + k_0 &= 0 \\
[y^2_3] + [y^2_9] + y^2_{12} + x^3_3 + k_5 &= 0 \\
y^2_5 + [y^2_8] + [x^3_{10}] + k_6 &= 0 \\
y^3_0 + x^4_4 + k_{15} &= 0
\end{aligned}$$

$$\begin{aligned}
&y^3_3 + y^3_9 + y^3_{12} + x^4_3 + k_{14} = 0 \\
&y^3_6 + y^3_9 + x^4_{11} + k_{10} = 0 \\
&y^4_3 + [y^4_9] + [y^4_{12}] + x^5_3 + k_6 = 0 \\
&y^4_4 + y^4_{11} + x^5_9 + k_0 = 0 \\
&y^5_3 + y^5_9 + [y^5_{12}] + [x^6_3] + k_{12} = 0 \\
&S(x^1_0) + y^1_0 = 0 \\
&S(x^2_5) + y^2_5 = 0 \\
&S(x^2_{12}) + y^2_{12} = 0 \\
&S(x^2_{13}) + y^2_{13} = 0 \\
&S(x^2_{15}) + y^2_{15} = 0 \\
&S(x^3_0) + y^3_0 = 0 \\
&S(x^3_3) + y^3_3 = 0 \\
&S(x^3_6) + y^3_6 = 0 \\
&S(x^3_{12}) + y^3_{12} = 0 \\
&S(x^4_3) + y^4_3 = 0 \\
&S(x^4_4) + y^4_4 = 0 \\
&S(x^4_{11}) + y^4_{11} = 0 \\
&S(x^5_3) + y^5_3 = 0 \\
&S(x^5_9) + y^5_9 = 0
\end{aligned}$$

the 11 th Minimal Constraint set is:

$$\begin{aligned}
&y^1_1 + x^2_5 + k_{15} = 0 \\
&y^1_1 + y^1_{11} + x^2_{13} + k_{15} = 0 \\
&[y^1_4] + y^1_{11} + [x^2_9] + k_{10} = 0 \\
&y^2_0 + y^2_{10} + y^2_{13} + x^3_0 + k_1 = 0 \\
&y^2_0 + y^2_{10} + x^3_{12} + k_1 = 0 \\
&y^2_5 + [y^2_8] + [x^3_{10}] + k_6 = 0 \\
&y^3_0 + [y^3_{10}] + [x^4_{12}] + k_{15} = 0 \\
&y^3_3 + y^3_9 + y^3_{12} + x^4_3 + k_{14} = 0 \\
&y^3_3 + y^3_9 + x^4_{15} + k_{14} = 0 \\
&[y^3_7] + [y^3_{10}] + x^4_8 + k_{13} = 0 \\
&[y^4_2] + y^4_8 + y^4_{15} + [x^5_2] + k_1 = 0 \\
&y^4_3 + [y^4_9] + [x^5_{15}] + k_6 = 0 \\
&S(x^2_5) + y^2_5 = 0 \\
&S(x^2_{13}) + y^2_{13} = 0 \\
&S(x^3_0) + y^3_0 = 0 \\
&S(x^3_{12}) + y^3_{12} = 0 \\
&S(x^4_3) + y^4_3 = 0 \\
&S(x^4_8) + y^4_8 = 0 \\
&S(x^4_{15}) + y^4_{15} = 0
\end{aligned}$$

the 12 th Minimal Constraint set is:

$$\begin{aligned}
&y^1_1 + x^2_5 + k_{15} = 0 \\
&y^1_1 + y^1_{11} + x^2_{13} + k_{15} = 0 \\
&[y^1_4] + y^1_{11} + [x^2_9] + k_{10} = 0 \\
&y^2_0 + y^2_{10} + y^2_{13} + x^3_0 + k_1 = 0
\end{aligned}$$

$$\begin{aligned}
y^{2_0} + y^{2_{10}} + x^{3_{12}} + k_1 &= 0 \\
y^{2_5} + [y^{2_8}] + [x^{3_{10}}] + k_6 &= 0 \\
y^{3_0} + [y^{3_{10}}] + [x^{4_{12}}] + k_{15} &= 0 \\
y^{3_3} + y^{3_9} + y^{3_{12}} + x^{4_3} + k_{14} &= 0 \\
y^{3_3} + y^{3_9} + x^{4_{15}} + k_{14} &= 0 \\
[y^{4_2}] + y^{4_8} + y^{4_{15}} + [x^{5_2}] + k_1 &= 0 \\
[y^{4_2}] + y^{4_8} + [x^{5_{14}}] + k_1 &= 0 \\
y^{4_3} + [y^{4_9}] + [x^{5_{15}}] + k_6 &= 0 \\
S(x^{2_5}) + y^{2_5} &= 0 \\
S(x^{2_{13}}) + y^{2_{13}} &= 0 \\
S(x^{3_0}) + y^{3_0} &= 0 \\
S(x^{3_{12}}) + y^{3_{12}} &= 0 \\
S(x^{4_3}) + y^{4_3} &= 0 \\
S(x^{4_{15}}) + y^{4_{15}} &= 0
\end{aligned}$$

the 13 th Minimal Constraint set is:

$$\begin{aligned}
[y^{0_0}] + y^{0_{10}} + [y^{0_{13}}] + x^{1_0} + k_0 &= 0 \\
[y^{0_0}] + y^{0_{10}} + [x^{1_{12}}] + k_0 &= 0 \\
y^{0_2} + y^{0_8} + [y^{0_{15}}] + [x^{1_2}] + k_2 &= 0 \\
y^{0_2} + y^{0_8} + x^{1_{14}} + k_2 &= 0 \\
[y^{0_3}] + [y^{0_9}] + x^{1_{15}} + k_3 &= 0 \\
y^{1_0} + x^{2_4} + k_9 &= 0 \\
y^{1_1} + y^{1_{11}} + y^{1_{14}} + x^{2_1} + k_{15} &= 0 \\
y^{1_1} + x^{2_5} + k_{15} &= 0 \\
[y^{1_2}] + y^{1_8} + y^{1_{15}} + x^{2_2} + k_8 &= 0 \\
[y^{1_2}] + y^{1_8} + x^{2_{14}} + k_8 &= 0 \\
[y^{1_4}] + y^{1_{11}} + [x^{2_9}] + k_{10} &= 0 \\
y^{2_1} + y^{2_{11}} + y^{2_{14}} + x^{3_1} + k_7 &= 0 \\
y^{2_2} + x^{3_6} + k_0 &= 0 \\
y^{2_4} + y^{2_{11}} + x^{3_9} + k_2 &= 0 \\
y^{2_5} + [y^{2_8}] + [x^{3_{10}}] + k_6 &= 0 \\
y^{3_1} + [y^{3_{11}}] + [y^{3_{14}}] + x^{4_1} + k_{11} &= 0 \\
y^{3_6} + y^{3_9} + x^{4_{11}} + k_{10} &= 0 \\
y^{4_1} + y^{4_{11}} + [y^{4_{14}}] + [x^{5_1}] + k_3 &= 0 \\
S(x^{1_0}) + y^{1_0} &= 0 \\
S(x^{1_{14}}) + y^{1_{14}} &= 0 \\
S(x^{1_{15}}) + y^{1_{15}} &= 0 \\
S(x^{2_1}) + y^{2_1} &= 0 \\
S(x^{2_2}) + y^{2_2} &= 0 \\
S(x^{2_4}) + y^{2_4} &= 0 \\
S(x^{2_5}) + y^{2_5} &= 0 \\
S(x^{2_{14}}) + y^{2_{14}} &= 0 \\
S(x^{3_1}) + y^{3_1} &= 0 \\
S(x^{3_6}) + y^{3_6} &= 0 \\
S(x^{3_9}) + y^{3_9} &= 0
\end{aligned}$$

$$S(x^{4_1}) + y^{4_1} = 0$$

$$S(x^{4_{11}}) + y^{4_{11}} = 0$$

the 14 th Minimal Constraint set is:

$$y^{0_2} + y^{0_8} + [y^{0_{15}}] + [x^{1_2}] + k_2 = 0$$

$$y^{0_2} + y^{0_8} + x^{1_{14}} + k_2 = 0$$

$$y^{1_0} + x^{2_4} + k_9 = 0$$

$$y^{1_0} + y^{1_{10}} + x^{2_{12}} + k_9 = 0$$

$$y^{1_1} + y^{1_{11}} + y^{1_{14}} + x^{2_1} + k_{15} = 0$$

$$y^{1_1} + y^{1_{11}} + x^{2_{13}} + k_{15} = 0$$

$$[y^{1_7}] + y^{1_{10}} + [x^{2_8}] + k_{11} = 0$$

$$y^{2_0} + y^{2_{10}} + y^{2_{13}} + x^{3_0} + k_1 = 0$$

$$y^{2_0} + y^{2_{10}} + x^{3_{12}} + k_1 = 0$$

$$y^{2_1} + y^{2_{11}} + x^{3_{13}} + k_7 = 0$$

$$[y^{2_3}] + [y^{2_9}] + y^{2_{12}} + x^{3_3} + k_5 = 0$$

$$y^{2_4} + y^{2_{11}} + x^{3_9} + k_2 = 0$$

$$y^{3_0} + [y^{3_{10}}] + y^{3_{13}} + [x^{4_0}] + k_{15} = 0$$

$$y^{3_3} + y^{3_9} + y^{3_{12}} + x^{4_3} + k_{14} = 0$$

$$y^{4_3} + [y^{4_9}] + [x^{5_{15}}] + k_6 = 0$$

$$S(x^{1_{14}}) + y^{1_{14}} = 0$$

$$S(x^{2_1}) + y^{2_1} = 0$$

$$S(x^{2_4}) + y^{2_4} = 0$$

$$S(x^{2_{12}}) + y^{2_{12}} = 0$$

$$S(x^{2_{13}}) + y^{2_{13}} = 0$$

$$S(x^{3_0}) + y^{3_0} = 0$$

$$S(x^{3_3}) + y^{3_3} = 0$$

$$S(x^{3_9}) + y^{3_9} = 0$$

$$S(x^{3_{12}}) + y^{3_{12}} = 0$$

$$S(x^{3_{13}}) + y^{3_{13}} = 0$$

$$S(x^{4_3}) + y^{4_3} = 0$$

the 15 th Minimal Constraint set is:

$$y^{0_2} + y^{0_8} + [y^{0_{15}}] + [x^{1_2}] + k_2 = 0$$

$$y^{0_2} + y^{0_8} + x^{1_{14}} + k_2 = 0$$

$$[y^{0_3}] + [y^{0_9}] + x^{1_{15}} + k_3 = 0$$

$$y^{1_0} + x^{2_4} + k_9 = 0$$

$$y^{1_0} + y^{1_{10}} + x^{2_{12}} + k_9 = 0$$

$$y^{1_1} + y^{1_{11}} + y^{1_{14}} + x^{2_1} + k_{15} = 0$$

$$y^{1_1} + y^{1_{11}} + x^{2_{13}} + k_{15} = 0$$

$$[y^{1_2}] + y^{1_8} + y^{1_{15}} + x^{2_2} + k_8 = 0$$

$$[y^{1_2}] + y^{1_8} + x^{2_{14}} + k_8 = 0$$

$$y^{1_3} + y^{1_9} + [y^{1_{12}}] + [x^{2_3}] + k_{13} = 0$$

$$y^{1_3} + y^{1_9} + x^{2_{15}} + k_{13} = 0$$

$$[y^{1_7}] + y^{1_{10}} + [x^{2_8}] + k_{11} = 0$$

$$y^{2_0} + y^{2_{10}} + y^{2_{13}} + x^{3_0} + k_1 = 0$$

$$y^{2_0} + y^{2_{10}} + x^{3_{12}} + k_1 = 0$$

$$\begin{aligned}
&y^2_{2_1} + y^2_{2_{11}} + y^2_{2_{14}} + x^3_{3_1} + k_7 = 0 \\
&y^2_{2_2} + [y^2_{2_8}] + y^2_{2_{15}} + [x^3_{3_2}] + k_0 = 0 \\
&[y^2_{2_3}] + [y^2_{2_9}] + y^2_{2_{12}} + x^3_{3_3} + k_5 = 0 \\
&y^2_{2_4} + y^2_{2_{11}} + x^3_{3_9} + k_2 = 0 \\
&y^3_{3_0} + [y^3_{3_{10}}] + [x^4_{4_{12}}] + k_{15} = 0 \\
&y^3_{3_1} + [y^3_{3_{11}}] + [x^4_{4_{13}}] + k_{11} = 0 \\
&y^3_{3_3} + y^3_{3_9} + y^3_{3_{12}} + x^4_{4_3} + k_{14} = 0 \\
&y^4_{4_3} + [y^4_{4_9}] + [x^5_{5_{15}}] + k_6 = 0 \\
&S(x^1_{1_{14}}) + y^1_{1_{14}} = 0 \\
&S(x^1_{1_{15}}) + y^1_{1_{15}} = 0 \\
&S(x^2_{2_1}) + y^2_{2_1} = 0 \\
&S(x^2_{2_2}) + y^2_{2_2} = 0 \\
&S(x^2_{2_4}) + y^2_{2_4} = 0 \\
&S(x^2_{2_{12}}) + y^2_{2_{12}} = 0 \\
&S(x^2_{2_{13}}) + y^2_{2_{13}} = 0 \\
&S(x^2_{2_{14}}) + y^2_{2_{14}} = 0 \\
&S(x^2_{2_{15}}) + y^2_{2_{15}} = 0 \\
&S(x^3_{3_0}) + y^3_{3_0} = 0 \\
&S(x^3_{3_1}) + y^3_{3_1} = 0 \\
&S(x^3_{3_3}) + y^3_{3_3} = 0 \\
&S(x^3_{3_9}) + y^3_{3_9} = 0 \\
&S(x^3_{3_{12}}) + y^3_{3_{12}} = 0 \\
&S(x^4_{4_3}) + y^4_{4_3} = 0
\end{aligned}$$

the 16 th Minimal Constraint set is:

$$\begin{aligned}
&[y^2_{2_3}] + [y^2_{2_9}] + x^3_{3_{15}} + k_5 = 0 \\
&[y^3_{3_2}] + y^3_{3_8} + y^3_{3_{15}} + [x^4_{4_2}] + k_9 = 0 \\
&[y^3_{3_2}] + y^3_{3_8} + [x^4_{4_{14}}] + k_9 = 0 \\
&S(x^3_{3_{15}}) + y^3_{3_{15}} = 0
\end{aligned}$$

the 17 th Minimal Constraint set is:

$$\begin{aligned}
&y^1_{1_3} + y^1_{1_9} + [y^1_{1_{12}}] + [x^2_{2_3}] + k_{13} = 0 \\
&y^1_{1_3} + y^1_{1_9} + x^2_{2_{15}} + k_{13} = 0 \\
&y^2_{2_2} + [y^2_{2_8}] + y^2_{2_{15}} + [x^3_{3_2}] + k_0 = 0 \\
&y^2_{2_2} + [y^2_{2_8}] + [x^3_{3_{14}}] + k_0 = 0 \\
&S(x^2_{2_{15}}) + y^2_{2_{15}} = 0
\end{aligned}$$

the 18 th Minimal Constraint set is:

$$\begin{aligned}
&[y^1_{1_2}] + x^2_{2_6} + k_8 = 0 \\
&y^2_{2_6} + [y^2_{2_9}] + [x^3_{3_{11}}] + k_4 = 0 \\
&S(x^2_{2_6}) + y^2_{2_6} = 0
\end{aligned}$$

the 19 th Minimal Constraint set is:

$$\begin{aligned}
&[y^0_{0_6}] + [y^0_{0_9}] + x^1_{1_{11}} + k_6 = 0 \\
&[y^1_{1_4}] + y^1_{1_{11}} + [x^2_{2_9}] + k_{10} = 0 \\
&S(x^1_{1_{11}}) + y^1_{1_{11}} = 0
\end{aligned}$$

the 20 th Minimal Constraint set is:

$$[y^0_{0_0}] + [x^1_{1_4}] + k_0 = 0$$

the 21 th Minimal Constraint set is:

$$[y^{0_3}] + [x^{1_7}] + k_3 = 0$$

the 22 th Minimal Constraint set is:

$$[y^{2_3}] + [x^{3_7}] + k_5 = 0$$

the 23 th Minimal Constraint set is:

$$[y^{3_2}] + [x^{4_6}] + k_9 = 0$$

the 24 th Minimal Constraint set is:

$$[y^{4_0}] + [x^{5_4}] + k_7 = 0$$

the 25 th Minimal Constraint set is:

$$[y^{4_2}] + [x^{5_6}] + k_1 = 0$$

the 26 th Minimal Constraint set is:

$$[y^{4_6}] + [y^{4_9}] + [x^{5_{11}}] + k_2 = 0$$

the 27 th Minimal Constraint set is:

$$[y^{5_1}] + [y^{5_{11}}] + [y^{5_{14}}] + [x^{6_1}] + k_{13} = 0$$

the 28 th Minimal Constraint set is:

$$[y^{5_1}] + [x^{6_5}] + k_{13} = 0$$

the 29 th Minimal Constraint set is:

$$[y^{5_2}] + [x^{6_6}] + k_{15} = 0$$

the 30 th Minimal Constraint set is:

$$[y^{5_4}] + [y^{5_{11}}] + [x^{6_9}] + k_9 = 0$$

the 31 th Minimal Constraint set is:

$$[y^{6_1}] + [x^{7_5}] + k_5 = 0$$

the 32 th Minimal Constraint set is:

$$[y^{6_3}] + [x^{7_7}] + k_4 = 0$$