Rank-65611 over GF(32)

January 15, 2021

The equation

The equation of the surface is :

$$X_3^3 + X_0^2X_3 + X_0X_1X_2 = 0$$

(0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(32) is -2112814043

General information

Number of lines	5
Number of points	1089
Number of singular points	3
Number of Eckardt points	2
Number of double points	2
Number of single points	155
Number of points off lines	930
Number of Hesse planes	0
Number of axes	0
Type of points on lines	33^5
Type of lines on points	3^2, 2^2, 1^{155}, 0^{930}

Singular Points

The surface has 3 singular points:

$0: \ P_1 = \mathbf{P}(0,1,0,0) = \mathbf{P}(0,1,0,0)$
$1: \ P_2 = \mathbf{P}(0,0,1,0) = \mathbf{P}(0,0,1,0)$
$2: \ P_{1059} = \mathbf{P}(1,0,0,1) = \mathbf{P}(1,0,0,1)$

The 5 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}_0 = \mathbf{Pl}(1,0,0,0,0,0)_0$$

$$\ell_1 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{1024} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{1024} = \mathbf{Pl}(0,0,1,0,0,0)_2$$

$$\ell_2 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{1082368} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{1082368} = \mathbf{Pl}(0,0,0,0,0,1)_{34849}$$

$$\ell_3 = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \end{bmatrix}_{33824} = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \end{bmatrix}_{33824} = \mathbf{Pl}(1,0,0,1,0,0)_{66}$$

$$\ell_4 = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{34848} = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{34848} = \mathbf{Pl}(0,1,1,0,0,0)_{34}$$

Rank of lines: (0, 1024, 1082368, 33824, 34848)
Rank of points on Klein quadric: (0, 2, 34849, 66, 34)

Eckardt Points

The surface has 2 Eckardt points:
$0 : P_1 = \mathbf{P}(0,1,0,0) = \mathbf{P}(0,1,0,0)$,
$1 : P_2 = \mathbf{P}(0,0,1,0) = \mathbf{P}(0,0,1,0)$.

Double Points

The surface has 2 Double points:
The double points on the surface are:

$P_0 = (1,0,0,0) = \ell_0 \cap \ell_1$
$P_{1059} = (1,0,0,1) = \ell_3 \cap \ell_4$

Single Points

The surface has 155 single points:
The single points on the surface are:

$0 : P_5 = (1,1,0,0)$ lies on line ℓ_0
$1 : P_6 = (2,1,0,0)$ lies on line ℓ_0
$2 : P_7 = (3,1,0,0)$ lies on line ℓ_0
$3 : P_8 = (4,1,0,0)$ lies on line ℓ_0
$4 : P_9 = (5,1,0,0)$ lies on line ℓ_0
$5 : P_{10} = (6,1,0,0)$ lies on line ℓ_0
$6 : P_{11} = (7,1,0,0)$ lies on line ℓ_0
$7 : P_{12} = (8,1,0,0)$ lies on line ℓ_0
$8 : P_{13} = (9,1,0,0)$ lies on line ℓ_0
$9 : P_{14} = (10,1,0,0)$ lies on line ℓ_0
$10 : P_{15} = (11,1,0,0)$ lies on line ℓ_0
$11 : P_{16} = (12,1,0,0)$ lies on line ℓ_0
$12 : P_{17} = (13,1,0,0)$ lies on line ℓ_0
$13 : P_{18} = (14,1,0,0)$ lies on line ℓ_0
$14 : P_{19} = (15,1,0,0)$ lies on line ℓ_0
$15 : P_{20} = (16,1,0,0)$ lies on line ℓ_0
$16 : P_{21} = (17,1,0,0)$ lies on line ℓ_0
$17 : P_{22} = (18,1,0,0)$ lies on line ℓ_0
$18 : P_{23} = (19,1,0,0)$ lies on line ℓ_0
$19 : P_{24} = (20,1,0,0)$ lies on line ℓ_0
$20 : P_{25} = (21,1,0,0)$ lies on line ℓ_0
$21 : P_{26} = (22,1,0,0)$ lies on line ℓ_0
$22 : P_{27} = (23,1,0,0)$ lies on line ℓ_0
$23 : P_{28} = (24,1,0,0)$ lies on line ℓ_0
$24 : P_{29} = (25,1,0,0)$ lies on line ℓ_0
$25 : P_{30} = (26,1,0,0)$ lies on line ℓ_0
$26 : P_{31} = (27,1,0,0)$ lies on line ℓ_0
$27 : P_{32} = (28,1,0,0)$ lies on line ℓ_0
$28 : P_{33} = (29,1,0,0)$ lies on line ℓ_0
$29 : P_{34} = (30,1,0,0)$ lies on line ℓ_0
$30 : P_{35} = (31,1,0,0)$ lies on line ℓ_0
$31 : P_{36} = (1,0,1,0)$ lies on line ℓ_1
$32 : P_{37} = (2,0,1,0)$ lies on line ℓ_1
$33 : P_{38} = (3,0,1,0)$ lies on line ℓ_1
$34 : P_{39} = (4,0,1,0)$ lies on line ℓ_1
$35 : P_{40} = (5,0,1,0)$ lies on line ℓ_1

36 : $P_{41} = (6, 0, 1, 0)$ lies on line ℓ_1
37 : $P_{42} = (7, 0, 1, 0)$ lies on line ℓ_1
38 : $P_{43} = (8, 0, 1, 0)$ lies on line ℓ_1
39 : $P_{44} = (9, 0, 1, 0)$ lies on line ℓ_1
40 : $P_{45} = (10, 0, 1, 0)$ lies on line ℓ_1
41 : $P_{46} = (11, 0, 1, 0)$ lies on line ℓ_1
42 : $P_{47} = (12, 0, 1, 0)$ lies on line ℓ_1
43 : $P_{48} = (13, 0, 1, 0)$ lies on line ℓ_1
44 : $P_{49} = (14, 0, 1, 0)$ lies on line ℓ_1
45 : $P_{50} = (15, 0, 1, 0)$ lies on line ℓ_1
46 : $P_{51} = (16, 0, 1, 0)$ lies on line ℓ_1
47 : $P_{52} = (17, 0, 1, 0)$ lies on line ℓ_1
48 : $P_{53} = (18, 0, 1, 0)$ lies on line ℓ_1
49 : $P_{54} = (19, 0, 1, 0)$ lies on line ℓ_1
50 : $P_{55} = (20, 0, 1, 0)$ lies on line ℓ_1
51 : $P_{56} = (21, 0, 1, 0)$ lies on line ℓ_1
52 : $P_{57} = (22, 0, 1, 0)$ lies on line ℓ_1
53 : $P_{58} = (23, 0, 1, 0)$ lies on line ℓ_1
54 : $P_{59} = (24, 0, 1, 0)$ lies on line ℓ_1
55 : $P_{60} = (25, 0, 1, 0)$ lies on line ℓ_1
56 : $P_{61} = (26, 0, 1, 0)$ lies on line ℓ_1
57 : $P_{62} = (27, 0, 1, 0)$ lies on line ℓ_1
58 : $P_{63} = (28, 0, 1, 0)$ lies on line ℓ_1
59 : $P_{64} = (29, 0, 1, 0)$ lies on line ℓ_1
60 : $P_{65} = (30, 0, 1, 0)$ lies on line ℓ_1
61 : $P_{66} = (31, 0, 1, 0)$ lies on line ℓ_1
62 : $P_{67} = (0, 1, 1, 0)$ lies on line ℓ_2
63 : $P_{99} = (0, 2, 1, 0)$ lies on line ℓ_2
64 : $P_{131} = (0, 3, 1, 0)$ lies on line ℓ_2
65 : $P_{163} = (0, 4, 1, 0)$ lies on line ℓ_2
66 : $P_{195} = (0, 5, 1, 0)$ lies on line ℓ_2
67 : $P_{227} = (0, 6, 1, 0)$ lies on line ℓ_2
68 : $P_{259} = (0, 7, 1, 0)$ lies on line ℓ_2
69 : $P_{291} = (0, 8, 1, 0)$ lies on line ℓ_2
70 : $P_{323} = (0, 9, 1, 0)$ lies on line ℓ_2
71 : $P_{355} = (0, 10, 1, 0)$ lies on line ℓ_2
72 : $P_{387} = (0, 11, 1, 0)$ lies on line ℓ_2
73 : $P_{419} = (0, 12, 1, 0)$ lies on line ℓ_2
74 : $P_{451} = (0, 13, 1, 0)$ lies on line ℓ_2
75 : $P_{483} = (0, 14, 1, 0)$ lies on line ℓ_2
76 : $P_{515} = (0, 15, 1, 0)$ lies on line ℓ_2
77 : $P_{547} = (0, 16, 1, 0)$ lies on line ℓ_2
78 : $P_{579} = (0, 17, 1, 0)$ lies on line ℓ_2
79 : $P_{611} = (0, 18, 1, 0)$ lies on line ℓ_2
80 : $P_{643} = (0, 19, 1, 0)$ lies on line ℓ_2
81 : $P_{675} = (0, 20, 1, 0)$ lies on line ℓ_2
82 : $P_{707} = (0, 21, 1, 0)$ lies on line ℓ_2
83 : $P_{739} = (0, 22, 1, 0)$ lies on line ℓ_2
84 : $P_{771} = (0, 23, 1, 0)$ lies on line ℓ_2
85 : $P_{803} = (0, 24, 1, 0)$ lies on line ℓ_2
86 : $P_{835} = (0, 25, 1, 0)$ lies on line ℓ_2
87 : $P_{867} = (0, 26, 1, 0)$ lies on line ℓ_2
88 : $P_{899} = (0, 27, 1, 0)$ lies on line ℓ_2
89 : $P_{931} = (0, 28, 1, 0)$ lies on line ℓ_2
90 : $P_{963} = (0, 29, 1, 0)$ lies on line ℓ_2
91 : $P_{995} = (0, 30, 1, 0)$ lies on line ℓ_2
92 : $P_{1027} = (0, 31, 1, 0)$ lies on line ℓ_2
93 : $P_{1091} = (1, 1, 0, 1)$ lies on line ℓ_3
94 : $P_{1123} = (1, 2, 0, 1)$ lies on line ℓ_3
95 : $P_{1155} = (1, 3, 0, 1)$ lies on line ℓ_3
96 : $P_{1187} = (1, 4, 0, 1)$ lies on line ℓ_3
97 : $P_{1219} = (1, 5, 0, 1)$ lies on line ℓ_3
98 : $P_{1251} = (1, 6, 0, 1)$ lies on line ℓ_3
99 : $P_{1283} = (1, 7, 0, 1)$ lies on line ℓ_3
100 : $P_{1315} = (1, 8, 0, 1)$ lies on line ℓ_3
101 : $P_{1347} = (1, 9, 0, 1)$ lies on line ℓ_3
102 : $P_{1379} = (1, 10, 0, 1)$ lies on line ℓ_3
103 : $P_{1411} = (1, 11, 0, 1)$ lies on line ℓ_3
104 : $P_{1443} = (1, 12, 0, 1)$ lies on line ℓ_3
105 : $P_{1475} = (1, 13, 0, 1)$ lies on line ℓ_3
106 : $P_{1507} = (1, 14, 0, 1)$ lies on line ℓ_3
107 : $P_{1539} = (1, 15, 0, 1)$ lies on line ℓ_3
108 : $P_{1571} = (1, 16, 0, 1)$ lies on line ℓ_3
109 : $P_{1603} = (1, 17, 0, 1)$ lies on line ℓ_3
110 : $P_{1635} = (1, 18, 0, 1)$ lies on line ℓ_3
111 : $P_{1667} = (1, 19, 0, 1)$ lies on line ℓ_3
112 : $P_{1699} = (1, 20, 0, 1)$ lies on line ℓ_3
113 : $P_{1731} = (1, 21, 0, 1)$ lies on line ℓ_3
114 : $P_{1763} = (1, 22, 0, 1)$ lies on line ℓ_3
115 : $P_{1795} = (1, 23, 0, 1)$ lies on line ℓ_3
116 : $P_{1827} = (1, 24, 0, 1)$ lies on line ℓ_3
117 : $P_{1859} = (1, 25, 0, 1)$ lies on line ℓ_3
118 : $P_{1891} = (1, 26, 0, 1)$ lies on line ℓ_3
119 : $P_{1923} = (1, 27, 0, 1)$ lies on line ℓ_3
120 : $P_{1955} = (1, 28, 0, 1)$ lies on line ℓ_3
121 : $P_{1987} = (1, 29, 0, 1)$ lies on line ℓ_3
122 : $P_{2019} = (1, 30, 0, 1)$ lies on line ℓ_3
123 : $P_{2051} = (1, 31, 0, 1)$ lies on line ℓ_3
124 : $P_{2083} = (1, 0, 1, 1)$ lies on line ℓ_4
125 : $P_{3106} = (1, 0, 2, 1)$ lies on line ℓ_4
126 : $P_{4130} = (1, 0, 3, 1)$ lies on line ℓ_4
127 : $P_{5154} = (1, 0, 4, 1)$ lies on line ℓ_4
128 : $P_{6178} = (1, 0, 5, 1)$ lies on line ℓ_4
129 : $P_{7202} = (1, 0, 6, 1)$ lies on line ℓ_4
130 : $P_{8226} = (1, 0, 7, 1)$ lies on line ℓ_4
131 : $P_{9250} = (1, 0, 8, 1)$ lies on line ℓ_4
132 : $P_{10274} = (1, 0, 9, 1)$ lies on line ℓ_4
133 : $P_{11298} = (1, 0, 10, 1)$ lies on line ℓ_4
134 : $P_{12322} = (1, 0, 11, 1)$ lies on line ℓ_4
135 : $P_{13346} = (1, 0, 12, 1)$ lies on line ℓ_4
136 : $P_{14370} = (1, 0, 13, 1)$ lies on line ℓ_4
137 : $P_{15394} = (1, 0, 14, 1)$ lies on line ℓ_4
138 : $P_{16418} = (1, 0, 15, 1)$ lies on line ℓ_4
139 : $P_{17442} = (1, 0, 16, 1)$ lies on line ℓ_4
140 : $P_{18466} = (1, 0, 17, 1)$ lies on line ℓ_4
141 : $P_{19490} = (1, 0, 18, 1)$ lies on line ℓ_4
142 : $P_{20514} = (1, 0, 19, 1)$ lies on line ℓ_4
143 : $P_{21538} = (1, 0, 20, 1)$ lies on line ℓ_4

144 : $P_{22562} = (1, 0, 21, 1)$ lies on line ℓ_4
145 : $P_{23586} = (1, 0, 22, 1)$ lies on line ℓ_4
146 : $P_{24610} = (1, 0, 23, 1)$ lies on line ℓ_4
147 : $P_{25634} = (1, 0, 24, 1)$ lies on line ℓ_4
148 : $P_{26658} = (1, 0, 25, 1)$ lies on line ℓ_4
149 : $P_{27682} = (1, 0, 26, 1)$ lies on line ℓ_4
150 : $P_{28706} = (1, 0, 27, 1)$ lies on line ℓ_4
151 : $P_{29730} = (1, 0, 28, 1)$ lies on line ℓ_4
152 : $P_{30754} = (1, 0, 29, 1)$ lies on line ℓ_4
153 : $P_{31778} = (1, 0, 30, 1)$ lies on line ℓ_4
154 : $P_{32802} = (1, 0, 31, 1)$ lies on line ℓ_4

The single points on the surface are:

Points on surface but on no line

The surface has 930 points not on any line:
The points on the surface but not on lines are:

0 : $P_{2158} = (13, 2, 1, 1)$
1 : $P_{2160} = (15, 2, 1, 1)$
2 : $P_{2236} = (27, 4, 1, 1)$
3 : $P_{2240} = (31, 4, 1, 1)$
4 : $P_{2343} = (6, 8, 1, 1)$
5 : $P_{2351} = (14, 8, 1, 1)$
6 : $P_{2386} = (17, 9, 1, 1)$
7 : $P_{2393} = (24, 9, 1, 1)$
8 : $P_{2421} = (20, 10, 1, 1)$
9 : $P_{2431} = (30, 10, 1, 1)$
10 : $P_{2440} = (7, 11, 1, 1)$
11 : $P_{2445} = (12, 11, 1, 1)$
12 : $P_{2501} = (4, 13, 1, 1)$
13 : $P_{2506} = (9, 13, 1, 1)$
14 : $P_{2548} = (19, 14, 1, 1)$
15 : $P_{2558} = (29, 14, 1, 1)$
16 : $P_{2582} = (21, 15, 1, 1)$
17 : $P_{2587} = (26, 15, 1, 1)$
18 : $P_{2595} = (2, 16, 1, 1)$
19 : $P_{2611} = (18, 16, 1, 1)$
20 : $P_{2662} = (5, 18, 1, 1)$
21 : $P_{2680} = (23, 18, 1, 1)$
22 : $P_{2699} = (10, 19, 1, 1)$
23 : $P_{2714} = (25, 19, 1, 1)$
24 : $P_{2956} = (11, 27, 1, 1)$
25 : $P_{2961} = (16, 27, 1, 1)$
26 : $P_{3049} = (8, 30, 1, 1)$
27 : $P_{3063} = (22, 30, 1, 1)$
28 : $P_{3076} = (3, 31, 1, 1)$
29 : $P_{3101} = (28, 31, 1, 1)$
30 : $P_{3150} = (13, 1, 2, 1)$
31 : $P_{3152} = (15, 1, 2, 1)$
32 : $P_{3196} = (27, 2, 2, 1)$
33 : $P_{3200} = (31, 2, 2, 1)$
34 : $P_{3239} = (6, 4, 2, 1)$
35 : $P_{3247} = (14, 4, 2, 1)$
36 : $P_{3285} = (20, 5, 2, 1)$
37 : $P_{3295} = (30, 5, 2, 1)$
38 : $P_{3348} = (19, 7, 2, 1)$
39 : $P_{3358} = (29, 7, 2, 1)$
40 : $P_{3363} = (2, 8, 2, 1)$
41 : $P_{3379} = (18, 8, 2, 1)$
42 : $P_{3398} = (5, 9, 2, 1)$
43 : $P_{3416} = (23, 9, 2, 1)$
44 : $P_{3593} = (8, 15, 2, 1)$
45 : $P_{3607} = (22, 15, 2, 1)$
46 : $P_{3749} = (4, 20, 2, 1)$
47 : $P_{3754} = (9, 20, 2, 1)$
48 : $P_{3798} = (21, 21, 2, 1)$
49 : $P_{3803} = (26, 21, 2, 1)$
50 : $P_{3826} = (17, 22, 2, 1)$
51 : $P_{3833} = (24, 22, 2, 1)$
52 : $P_{3848} = (7, 23, 2, 1)$
53 : $P_{3853} = (12, 23, 2, 1)$
54 : $P_{3979} = (10, 27, 2, 1)$
55 : $P_{3994} = (25, 27, 2, 1)$
56 : $P_{4036} = (3, 29, 2, 1)$
57 : $P_{4061} = (28, 29, 2, 1)$
58 : $P_{4108} = (11, 31, 2, 1)$
59 : $P_{4113} = (16, 31, 2, 1)$
60 : $P_{4310} = (21, 5, 3, 1)$
61 : $P_{4315} = (26, 5, 3, 1)$
62 : $P_{4341} = (20, 6, 3, 1)$
63 : $P_{4351} = (30, 6, 3, 1)$
64 : $P_{4370} = (17, 7, 3, 1)$
65 : $P_{4377} = (24, 7, 3, 1)$
66 : $P_{4428} = (11, 9, 3, 1)$
67 : $P_{4433} = (16, 9, 3, 1)$
68 : $P_{4457} = (8, 10, 3, 1)$
69 : $P_{4471} = (22, 10, 3, 1)$
70 : $P_{4582} = (5, 14, 3, 1)$
71 : $P_{4600} = (23, 14, 3, 1)$
72 : $P_{4715} = (10, 18, 3, 1)$
73 : $P_{4730} = (25, 18, 3, 1)$
74 : $P_{4739} = (2, 19, 3, 1)$
75 : $P_{4755} = (18, 19, 3, 1)$

$76: P_{4836} = (3, 22, 3, 1)$
$77: P_{4861} = (28, 22, 3, 1)$
$78: P_{4901} = (4, 24, 3, 1)$
$79: P_{4906} = (9, 24, 3, 1)$
$80: P_{4948} = (19, 25, 3, 1)$
$81: P_{4958} = (29, 25, 3, 1)$
$82: P_{4968} = (7, 26, 3, 1)$
$83: P_{4973} = (12, 26, 3, 1)$
$84: P_{4999} = (6, 27, 3, 1)$
$85: P_{5007} = (14, 27, 3, 1)$
$86: P_{5070} = (13, 29, 3, 1)$
$87: P_{5072} = (15, 29, 3, 1)$
$88: P_{5148} = (27, 31, 3, 1)$
$89: P_{5152} = (31, 31, 3, 1)$
$90: P_{5212} = (27, 1, 4, 1)$
$91: P_{5216} = (31, 1, 4, 1)$
$92: P_{5223} = (6, 2, 4, 1)$
$93: P_{5231} = (14, 2, 4, 1)$
$94: P_{5283} = (2, 4, 4, 1)$
$95: P_{5299} = (18, 4, 4, 1)$
$96: P_{5477} = (4, 10, 4, 1)$
$97: P_{5482} = (9, 10, 4, 1)$
$98: P_{5522} = (17, 11, 4, 1)$
$99: P_{5529} = (24, 11, 4, 1)$
$100: P_{5685} = (20, 16, 4, 1)$
$101: P_{5695} = (30, 16, 4, 1)$
$102: P_{5716} = (19, 17, 4, 1)$
$103: P_{5726} = (29, 17, 4, 1)$
$104: P_{5742} = (13, 18, 4, 1)$
$105: P_{5744} = (15, 18, 4, 1)$
$106: P_{5833} = (8, 21, 4, 1)$
$107: P_{5847} = (22, 21, 4, 1)$
$108: P_{5862} = (5, 22, 4, 1)$
$109: P_{5880} = (23, 22, 4, 1)$
$110: P_{5942} = (21, 24, 4, 1)$
$111: P_{5947} = (26, 24, 4, 1)$
$112: P_{5960} = (7, 25, 4, 1)$
$113: P_{5965} = (12, 25, 4, 1)$
$114: P_{6052} = (3, 28, 4, 1)$
$115: P_{6077} = (28, 28, 4, 1)$
$116: P_{6092} = (11, 29, 4, 1)$
$117: P_{6097} = (16, 29, 4, 1)$
$118: P_{6155} = (10, 31, 4, 1)$
$119: P_{6170} = (25, 31, 4, 1)$
$120: P_{6261} = (20, 2, 5, 1)$
$121: P_{6271} = (30, 2, 5, 1)$
$122: P_{6294} = (21, 3, 5, 1)$
$123: P_{6299} = (26, 3, 5, 1)$
$124: P_{6377} = (8, 6, 5, 1)$
$125: P_{6391} = (22, 6, 5, 1)$
$126: P_{6412} = (11, 7, 5, 1)$
$127: P_{6417} = (16, 7, 5, 1)$
$128: P_{6437} = (4, 8, 5, 1)$
$129: P_{6442} = (9, 8, 5, 1)$
$130: P_{6471} = (6, 9, 5, 1)$
$131: P_{6479} = (14, 9, 5, 1)$
$132: P_{6542} = (13, 11, 5, 1)$
$133: P_{6544} = (15, 11, 5, 1)$
$134: P_{6635} = (10, 14, 5, 1)$
$135: P_{6650} = (25, 14, 5, 1)$
$136: P_{6724} = (3, 17, 5, 1)$
$137: P_{6749} = (28, 17, 5, 1)$
$138: P_{6755} = (2, 18, 5, 1)$
$139: P_{6771} = (18, 18, 5, 1)$
$140: P_{6836} = (19, 20, 5, 1)$
$141: P_{6846} = (29, 20, 5, 1)$
$142: P_{6856} = (7, 21, 5, 1)$
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$553: P_{21069} = (12, 17, 19, 1)$
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$560: P_{21189} = (4, 21, 19, 1)$
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$562: P_{21268} = (19, 23, 19, 1)$
$563: P_{21278} = (29, 23, 19, 1)$
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$599: P_{22427} = (26, 27, 20, 1)$
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$601: P_{22651} = (26, 2, 21, 1)$
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$603: P_{22711} = (22, 4, 21, 1)$
$604: P_{22728} = (7, 5, 21, 1)$
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$611: P_{23023} = (14, 14, 21, 1)$
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$641: P_{23818} = (9, 7, 22, 1)$
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$643: P_{23919} = (14, 10, 22, 1)$
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$646: P_{23979} = (10, 12, 22, 1)$
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$649: P_{24112} = (15, 16, 22, 1)$
$650: P_{24168} = (7, 18, 22, 1)$
$651: P_{24173} = (12, 18, 22, 1)$
$652: P_{24227} = (2, 20, 22, 1)$
$653: P_{24243} = (18, 20, 22, 1)$
$654: P_{24342} = (21, 23, 22, 1)$
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$656: P_{24437} = (20, 26, 22, 1)$
$657: P_{24447} = (30, 26, 22, 1)$
$658: P_{24596} = (19, 31, 22, 1)$
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$661: P_{24685} = (12, 2, 23, 1)$
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$663: P_{24863} = (30, 7, 23, 1)$
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$667: P_{24919} = (22, 9, 23, 1)$
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$672: P_{25031} = (6, 13, 23, 1)$
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$675: P_{25144} = (23, 16, 23, 1)$
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$677: P_{25246} = (29, 19, 23, 1)$
$678: P_{25276} = (27, 20, 23, 1)$
$679: P_{25280} = (31, 20, 23, 1)$
$680: P_{25291} = (10, 21, 23, 1)$
$681: P_{25306} = (25, 21, 23, 1)$
$682: P_{25334} = (21, 22, 23, 1)$
$683: P_{25339} = (26, 22, 23, 1)$
$684: P_{25388} = (11, 24, 23, 1)$
$685: P_{25393} = (16, 24, 23, 1)$
$686: P_{25443} = (2, 26, 23, 1)$
$687: P_{25459} = (18, 26, 23, 1)$
$688: P_{25509} = (4, 28, 23, 1)$
$689: P_{25514} = (9, 28, 23, 1)$
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$691: P_{25738} = (9, 3, 24, 1)$
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$693: P_{25787} = (26, 4, 24, 1)$
$694: P_{25870} = (13, 7, 24, 1)$
$695: P_{25872} = (15, 7, 24, 1)$
$696: P_{25897} = (8, 8, 24, 1)$
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$698: P_{25960} = (7, 10, 24, 1)$
$699: P_{25965} = (12, 10, 24, 1)$
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$701: P_{26010} = (25, 11, 24, 1)$
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$703: P_{26073} = (24, 13, 24, 1)$
$704: P_{26108} = (27, 14, 24, 1)$
$705: P_{26112} = (31, 14, 24, 1)$
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$707: P_{26334} = (29, 21, 24, 1)$
$708: P_{26380} = (11, 23, 24, 1)$
$709: P_{26385} = (16, 23, 24, 1)$
$710: P_{26436} = (3, 25, 24, 1)$
$711: P_{26461} = (28, 25, 24, 1)$
$712: P_{26470} = (5, 26, 24, 1)$
$713: P_{26488} = (23, 26, 24, 1)$
$714: P_{26517} = (20, 27, 24, 1)$
$715: P_{26527} = (30, 27, 24, 1)$
$716: P_{26535} = (6, 28, 24, 1)$
$717: P_{26543} = (14, 28, 24, 1)$
$718: P_{26563} = (2, 29, 24, 1)$
$719: P_{26579} = (18, 29, 24, 1)$
$720: P_{26772} = (19, 3, 25, 1)$
$721: P_{26782} = (29, 3, 25, 1)$
$722: P_{26792} = (7, 4, 25, 1)$
$723: P_{26797} = (12, 4, 25, 1)$

$724: P_{26822} = (5, 5, 25, 1)$
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$727: P_{26971} = (26, 9, 25, 1)$
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$729: P_{27104} = (31, 13, 25, 1)$
$730: P_{27125} = (20, 14, 25, 1)$
$731: P_{27135} = (30, 14, 25, 1)$
$732: P_{27147} = (10, 15, 25, 1)$
$733: P_{27162} = (25, 15, 25, 1)$
$734: P_{27186} = (17, 16, 25, 1)$
$735: P_{27193} = (24, 16, 25, 1)$
$736: P_{27203} = (2, 17, 25, 1)$
$737: P_{27219} = (18, 17, 25, 1)$
$738: P_{27241} = (8, 18, 25, 1)$
$739: P_{27255} = (22, 18, 25, 1)$
$740: P_{27310} = (13, 20, 25, 1)$
$741: P_{27312} = (15, 20, 25, 1)$
$742: P_{27340} = (11, 21, 25, 1)$
$743: P_{27345} = (16, 21, 25, 1)$
$744: P_{27428} = (3, 24, 25, 1)$
$745: P_{27453} = (28, 24, 25, 1)$
$746: P_{27495} = (6, 26, 25, 1)$
$747: P_{27503} = (14, 26, 25, 1)$
$748: P_{27589} = (4, 29, 25, 1)$
$749: P_{27594} = (9, 29, 25, 1)$
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$751: P_{27789} = (12, 3, 26, 1)$
$752: P_{27956} = (19, 8, 26, 1)$
$753: P_{27966} = (29, 8, 26, 1)$
$754: P_{28004} = (3, 10, 26, 1)$
$755: P_{28029} = (28, 10, 26, 1)$
$756: P_{28082} = (17, 12, 26, 1)$
$757: P_{28089} = (24, 12, 26, 1)$
$758: P_{28107} = (10, 13, 26, 1)$
$759: P_{28122} = (25, 13, 26, 1)$
$760: P_{28174} = (13, 15, 26, 1)$
$761: P_{28176} = (15, 15, 26, 1)$
$762: P_{28261} = (4, 18, 26, 1)$
$763: P_{28266} = (9, 18, 26, 1)$
$764: P_{28332} = (11, 20, 26, 1)$
$765: P_{28337} = (16, 20, 26, 1)$
$766: P_{28405} = (20, 22, 26, 1)$
$767: P_{28415} = (30, 22, 26, 1)$
$768: P_{28419} = (2, 23, 26, 1)$
$769: P_{28435} = (18, 23, 26, 1)$
$770: P_{28454} = (5, 24, 26, 1)$
$771: P_{28472} = (23, 24, 26, 1)$
$772: P_{28487} = (6, 25, 26, 1)$
$773: P_{28495} = (14, 25, 26, 1)$
$774: P_{28630} = (21, 29, 26, 1)$
$775: P_{28635} = (26, 29, 26, 1)$
$776: P_{28668} = (27, 30, 26, 1)$
$777: P_{28672} = (31, 30, 26, 1)$
$778: P_{28681} = (8, 31, 26, 1)$
$779: P_{28695} = (22, 31, 26, 1)$
$780: P_{28748} = (11, 1, 27, 1)$
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$782: P_{28779} = (10, 2, 27, 1)$
$783: P_{28794} = (25, 2, 27, 1)$
$784: P_{28807} = (6, 3, 27, 1)$
$785: P_{28815} = (14, 3, 27, 1)$
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$787: P_{28915} = (18, 6, 27, 1)$
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$789: P_{28941} = (12, 7, 27, 1)$
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$791: P_{29086} = (29, 11, 27, 1)$
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$793: P_{29143} = (22, 13, 27, 1)$
$794: P_{29189} = (4, 15, 27, 1)$
$795: P_{29194} = (9, 15, 27, 1)$
$796: P_{29284} = (3, 18, 27, 1)$
$797: P_{29309} = (28, 18, 27, 1)$
$798: P_{29340} = (27, 19, 27, 1)$
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$801: P_{29371} = (26, 20, 27, 1)$
$802: P_{29493} = (20, 24, 27, 1)$
$803: P_{29503} = (30, 24, 27, 1)$
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$805: P_{29584} = (15, 27, 27, 1)$
$806: P_{29618} = (17, 28, 27, 1)$
$807: P_{29625} = (24, 28, 27, 1)$
$808: P_{29638} = (5, 29, 27, 1)$
$809: P_{29656} = (23, 29, 27, 1)$
$810: P_{29860} = (3, 4, 28, 1)$
$811: P_{29885} = (28, 4, 28, 1)$
$812: P_{29934} = (13, 6, 28, 1)$
$813: P_{29936} = (15, 6, 28, 1)$
$814: P_{29961} = (8, 7, 28, 1)$
$815: P_{29975} = (22, 7, 28, 1)$
$816: P_{29996} = (11, 8, 28, 1)$
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$818: P_{30140} = (27, 12, 28, 1)$
$819: P_{30144} = (31, 12, 28, 1)$
$820: P_{30251} = (10, 16, 28, 1)$
$821: P_{30266} = (25, 16, 28, 1)$
$822: P_{30294} = (21, 17, 28, 1)$
$823: P_{30299} = (26, 17, 28, 1)$
$824: P_{30324} = (19, 18, 28, 1)$
$825: P_{30334} = (29, 18, 28, 1)$
$826: P_{30342} = (5, 19, 28, 1)$
$827: P_{30360} = (23, 19, 28, 1)$
$828: P_{30403} = (2, 21, 28, 1)$
$829: P_{30419} = (18, 21, 28, 1)$
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$831: P_{30474} = (9, 23, 28, 1)$

832 : $P_{30503} = (6, 24, 28, 1)$
833 : $P_{30511} = (14, 24, 28, 1)$
834 : $P_{30610} = (17, 27, 28, 1)$
835 : $P_{30617} = (24, 27, 28, 1)$
836 : $P_{30664} = (7, 29, 28, 1)$
837 : $P_{30669} = (12, 29, 28, 1)$
838 : $P_{30709} = (20, 30, 28, 1)$
839 : $P_{30719} = (30, 30, 28, 1)$
840 : $P_{30820} = (3, 2, 29, 1)$
841 : $P_{30845} = (28, 2, 29, 1)$
842 : $P_{30862} = (13, 3, 29, 1)$
843 : $P_{30864} = (15, 3, 29, 1)$
844 : $P_{30892} = (11, 4, 29, 1)$
845 : $P_{30897} = (16, 4, 29, 1)$
846 : $P_{30972} = (27, 6, 29, 1)$
847 : $P_{30976} = (31, 6, 29, 1)$
848 : $P_{31019} = (10, 8, 29, 1)$
849 : $P_{31034} = (25, 8, 29, 1)$
850 : $P_{31060} = (19, 9, 29, 1)$
851 : $P_{31070} = (29, 9, 29, 1)$
852 : $P_{31143} = (6, 12, 29, 1)$
853 : $P_{31151} = (14, 12, 29, 1)$
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855 : $P_{31263} = (30, 15, 29, 1)$
856 : $P_{31305} = (8, 17, 29, 1)$
857 : $P_{31319} = (22, 17, 29, 1)$
858 : $P_{31523} = (2, 24, 29, 1)$
859 : $P_{31539} = (18, 24, 29, 1)$
860 : $P_{31557} = (4, 25, 29, 1)$
861 : $P_{31562} = (9, 25, 29, 1)$
862 : $P_{31606} = (21, 26, 29, 1)$
863 : $P_{31611} = (26, 26, 29, 1)$
864 : $P_{31622} = (5, 27, 29, 1)$
865 : $P_{31640} = (23, 27, 29, 1)$
866 : $P_{31656} = (7, 28, 29, 1)$
867 : $P_{31661} = (12, 28, 29, 1)$
868 : $P_{31762} = (17, 31, 29, 1)$
869 : $P_{31769} = (24, 31, 29, 1)$
870 : $P_{31817} = (8, 1, 30, 1)$
871 : $P_{31831} = (22, 1, 30, 1)$
872 : $P_{31954} = (17, 5, 30, 1)$
873 : $P_{31961} = (24, 5, 30, 1)$
874 : $P_{31988} = (19, 6, 30, 1)$
875 : $P_{31998} = (29, 6, 30, 1)$
876 : $P_{32003} = (2, 7, 30, 1)$
877 : $P_{32019} = (18, 7, 30, 1)$
878 : $P_{32040} = (7, 8, 30, 1)$
879 : $P_{32045} = (12, 8, 30, 1)$
880 : $P_{32102} = (5, 10, 30, 1)$
881 : $P_{32120} = (23, 10, 30, 1)$
882 : $P_{32206} = (13, 13, 30, 1)$
883 : $P_{32208} = (15, 13, 30, 1)$
884 : $P_{32268} = (11, 15, 30, 1)$
885 : $P_{32273} = (16, 15, 30, 1)$
886 : $P_{32327} = (6, 17, 30, 1)$
887 : $P_{32335} = (14, 17, 30, 1)$
888 : $P_{32374} = (21, 18, 30, 1)$
889 : $P_{32379} = (26, 18, 30, 1)$
890 : $P_{32452} = (3, 21, 30, 1)$
891 : $P_{32477} = (28, 21, 30, 1)$
892 : $P_{32636} = (27, 26, 30, 1)$
893 : $P_{32640} = (31, 26, 30, 1)$
894 : $P_{32693} = (20, 28, 30, 1)$
895 : $P_{32703} = (30, 28, 30, 1)$
896 : $P_{32747} = (10, 30, 30, 1)$
897 : $P_{32762} = (25, 30, 30, 1)$
898 : $P_{32773} = (4, 31, 30, 1)$
899 : $P_{32778} = (9, 31, 30, 1)$
900 : $P_{32836} = (3, 1, 31, 1)$
901 : $P_{32861} = (28, 1, 31, 1)$
902 : $P_{32876} = (11, 2, 31, 1)$
903 : $P_{32881} = (16, 2, 31, 1)$
904 : $P_{32924} = (27, 3, 31, 1)$
905 : $P_{32928} = (31, 3, 31, 1)$
906 : $P_{32939} = (10, 4, 31, 1)$
907 : $P_{32954} = (25, 4, 31, 1)$
908 : $P_{32999} = (6, 6, 31, 1)$
909 : $P_{33007} = (14, 6, 31, 1)$
910 : $P_{33187} = (2, 12, 31, 1)$
911 : $P_{33203} = (18, 12, 31, 1)$
912 : $P_{33238} = (21, 13, 31, 1)$
913 : $P_{33243} = (26, 13, 31, 1)$
914 : $P_{33256} = (7, 14, 31, 1)$
915 : $P_{33261} = (12, 14, 31, 1)$
916 : $P_{33422} = (13, 19, 31, 1)$
917 : $P_{33424} = (15, 19, 31, 1)$
918 : $P_{33493} = (20, 21, 31, 1)$
919 : $P_{33503} = (30, 21, 31, 1)$
920 : $P_{33524} = (19, 22, 31, 1)$
921 : $P_{33534} = (29, 22, 31, 1)$
922 : $P_{33641} = (8, 26, 31, 1)$
923 : $P_{33655} = (22, 26, 31, 1)$
924 : $P_{33746} = (17, 29, 31, 1)$
925 : $P_{33753} = (24, 29, 31, 1)$
926 : $P_{33765} = (4, 30, 31, 1)$
927 : $P_{33770} = (9, 30, 31, 1)$
928 : $P_{33798} = (5, 31, 31, 1)$
929 : $P_{33816} = (23, 31, 31, 1)$

Line Intersection Graph

	0 1 2 3 4
0	0 1 1 1 0
1	1 0 1 0 1
2	1 1 0 1 1
3	1 0 1 0 1
4	0 1 1 1 0

Neighbor sets in the line intersection graph:
Line 0 intersects

Line	ℓ_1	ℓ_2	ℓ_3
in point	P_0	P_1	P_1

Line 1 intersects

Line	ℓ_0	ℓ_2	ℓ_4
in point	P_0	P_2	P_2

Line 2 intersects

Line	ℓ_0	ℓ_1	ℓ_3	ℓ_4
in point	P_1	P_2	P_1	P_2

Line 3 intersects

Line	ℓ_0	ℓ_2	ℓ_4
in point	P_1	P_1	P_{1059}

Line 4 intersects

Line	ℓ_1	ℓ_2	ℓ_3
in point	P_2	P_2	P_{1059}

The surface has 1089 points:
Too many to print.