Rank-65618 over GF(32)

January 15, 2021

The equation

The equation of the surface is :

$$X_0^3 + X_1^3 + X_2^3 + X_3^3 + X_0^2X_3 + X_0X_1X_2 = 0$$

(1, 1, 1, 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 -2112812986

General information

Number of lines	4
Number of points	1089
Number of singular points	1
Number of Eckardt points	0
Number of double points	4
Number of single points	124
Number of points off lines	961
Number of Hesse planes	0
Number of axes	0
Type of points on lines	33^4
Type of lines on points	2^4, 1^{124}, 0^{961}

Singular Points

The surface has 1 singular points:

$0 : \ P_4 = \mathbf{P}(1,1,1,1) = \mathbf{P}(1,1,1,1)$

The 4 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \left[\begin{array}{cccc} 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \end{array}\right]_{1058} = \left[\begin{array}{cccc} 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \end{array}\right]_{1058} = \mathbf{Pl}(1,0,1,0,0,1)_{34913}$$

$$\ell_1 = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{2082} = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{2082} = \mathbf{Pl}(0,0,1,1,1,1)_{70562}$$
$$\ell_2 = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}_{1089} = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}_{1089} = \mathbf{Pl}(1,1,0,0,1,1)_{68609}$$
$$\ell_3 = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}_{34882} = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}_{34882} = \mathbf{Pl}(1,1,1,1,0,1)_{38818}$$

Rank of lines: (1058, 2082, 1089, 34882)
Rank of points on Klein quadric: (34913, 70562, 68609, 38818)

Eckardt Points

The surface has 0 Eckardt points:

Double Points

The surface has 4 Double points:
The double points on the surface are:

$P_5 = (1,1,0,0) = \ell_0 \cap \ell_1$
$P_{36} = (1,0,1,0) = \ell_0 \cap \ell_2$
$P_{67} = (0,1,1,0) = \ell_0 \cap \ell_3$
$P_4 = (1,1,1,1) = \ell_1 \cap \ell_2$

Single Points

The surface has 124 single points:
The single points on the surface are:

0 : $P_{102} = (3,2,1,0)$ lies on line ℓ_0
1 : $P_{133} = (2,3,1,0)$ lies on line ℓ_0
2 : $P_{168} = (5,4,1,0)$ lies on line ℓ_0
3 : $P_{199} = (4,5,1,0)$ lies on line ℓ_0
4 : $P_{234} = (7,6,1,0)$ lies on line ℓ_0
5 : $P_{265} = (6,7,1,0)$ lies on line ℓ_0
6 : $P_{300} = (9,8,1,0)$ lies on line ℓ_0
7 : $P_{331} = (8,9,1,0)$ lies on line ℓ_0
8 : $P_{366} = (11,10,1,0)$ lies on line ℓ_0
9 : $P_{397} = (10,11,1,0)$ lies on line ℓ_0
10 : $P_{432} = (13,12,1,0)$ lies on line ℓ_0
11 : $P_{463} = (12,13,1,0)$ lies on line ℓ_0
12 : $P_{498} = (15,14,1,0)$ lies on line ℓ_0
13 : $P_{529} = (14,15,1,0)$ lies on line ℓ_0
14 : $P_{564} = (17,16,1,0)$ lies on line ℓ_0
15 : $P_{595} = (16,17,1,0)$ lies on line ℓ_0
16 : $P_{630} = (19,18,1,0)$ lies on line ℓ_0
17 : $P_{661} = (18,19,1,0)$ lies on line ℓ_0
18 : $P_{696} = (21,20,1,0)$ lies on line ℓ_0
19 : $P_{727} = (20,21,1,0)$ lies on line ℓ_0
20 : $P_{762} = (23,22,1,0)$ lies on line ℓ_0
21 : $P_{793} = (22,23,1,0)$ lies on line ℓ_0
22 : $P_{828} = (25,24,1,0)$ lies on line ℓ_0
23 : $P_{859} = (24,25,1,0)$ lies on line ℓ_0
24 : $P_{894} = (27,26,1,0)$ lies on line ℓ_0
25 : $P_{925} = (26,27,1,0)$ lies on line ℓ_0
26 : $P_{960} = (29,28,1,0)$ lies on line ℓ_0
27 : $P_{991} = (28,29,1,0)$ lies on line ℓ_0
28 : $P_{1026} = (31,30,1,0)$ lies on line ℓ_0
29 : $P_{1057} = (30,31,1,0)$ lies on line ℓ_0
30 : $P_{1090} = (0,1,0,1)$ lies on line ℓ_2
31 : $P_{1091} = (1,1,0,1)$ lies on line ℓ_3
32 : $P_{2082} = (0,0,1,1)$ lies on line ℓ_1
33 : $P_{2083} = (1,0,1,1)$ lies on line ℓ_3
34 : $P_{2147} = (2,2,1,1)$ lies on line ℓ_1
35 : $P_{2180} = (3,3,1,1)$ lies on line ℓ_1
36 : $P_{2213} = (4,4,1,1)$ lies on line ℓ_1
37 : $P_{2246} = (5,5,1,1)$ lies on line ℓ_1
38 : $P_{2279} = (6,6,1,1)$ lies on line ℓ_1
39 : $P_{2312} = (7,7,1,1)$ lies on line ℓ_1
40 : $P_{2345} = (8,8,1,1)$ lies on line ℓ_1
41 : $P_{2378} = (9,9,1,1)$ lies on line ℓ_1
42 : $P_{2411} = (10,10,1,1)$ lies on line ℓ_1
43 : $P_{2444} = (11,11,1,1)$ lies on line ℓ_1

44 : $P_{2477} = (12, 12, 1, 1)$ lies on line ℓ_1
45 : $P_{2510} = (13, 13, 1, 1)$ lies on line ℓ_1
46 : $P_{2543} = (14, 14, 1, 1)$ lies on line ℓ_1
47 : $P_{2576} = (15, 15, 1, 1)$ lies on line ℓ_1
48 : $P_{2609} = (16, 16, 1, 1)$ lies on line ℓ_1
49 : $P_{2642} = (17, 17, 1, 1)$ lies on line ℓ_1
50 : $P_{2675} = (18, 18, 1, 1)$ lies on line ℓ_1
51 : $P_{2708} = (19, 19, 1, 1)$ lies on line ℓ_1
52 : $P_{2741} = (20, 20, 1, 1)$ lies on line ℓ_1
53 : $P_{2774} = (21, 21, 1, 1)$ lies on line ℓ_1
54 : $P_{2807} = (22, 22, 1, 1)$ lies on line ℓ_1
55 : $P_{2840} = (23, 23, 1, 1)$ lies on line ℓ_1
56 : $P_{2873} = (24, 24, 1, 1)$ lies on line ℓ_1
57 : $P_{2906} = (25, 25, 1, 1)$ lies on line ℓ_1
58 : $P_{2939} = (26, 26, 1, 1)$ lies on line ℓ_1
59 : $P_{2972} = (27, 27, 1, 1)$ lies on line ℓ_1
60 : $P_{3005} = (28, 28, 1, 1)$ lies on line ℓ_1
61 : $P_{3038} = (29, 29, 1, 1)$ lies on line ℓ_1
62 : $P_{3071} = (30, 30, 1, 1)$ lies on line ℓ_1
63 : $P_{3104} = (31, 31, 1, 1)$ lies on line ℓ_1
64 : $P_{3139} = (2, 1, 2, 1)$ lies on line ℓ_2
65 : $P_{3202} = (1, 3, 2, 1)$ lies on line ℓ_3
66 : $P_{4164} = (3, 1, 3, 1)$ lies on line ℓ_2
67 : $P_{4194} = (1, 2, 3, 1)$ lies on line ℓ_3
68 : $P_{5189} = (4, 1, 4, 1)$ lies on line ℓ_2
69 : $P_{5314} = (1, 5, 4, 1)$ lies on line ℓ_3
70 : $P_{6214} = (5, 1, 5, 1)$ lies on line ℓ_2
71 : $P_{6306} = (1, 4, 5, 1)$ lies on line ℓ_3
72 : $P_{7239} = (6, 1, 6, 1)$ lies on line ℓ_2
73 : $P_{7426} = (1, 7, 6, 1)$ lies on line ℓ_3
74 : $P_{8264} = (7, 1, 7, 1)$ lies on line ℓ_2
75 : $P_{8418} = (1, 6, 7, 1)$ lies on line ℓ_3
76 : $P_{9289} = (8, 1, 8, 1)$ lies on line ℓ_2
77 : $P_{9538} = (1, 9, 8, 1)$ lies on line ℓ_3
78 : $P_{10314} = (9, 1, 9, 1)$ lies on line ℓ_2
79 : $P_{10530} = (1, 8, 9, 1)$ lies on line ℓ_3
80 : $P_{11339} = (10, 1, 10, 1)$ lies on line ℓ_2
81 : $P_{11650} = (1, 11, 10, 1)$ lies on line ℓ_3
82 : $P_{12364} = (11, 1, 11, 1)$ lies on line ℓ_2
83 : $P_{12642} = (1, 10, 11, 1)$ lies on line ℓ_3
84 : $P_{13389} = (12, 1, 12, 1)$ lies on line ℓ_2
85 : $P_{13762} = (1, 13, 12, 1)$ lies on line ℓ_3
86 : $P_{14414} = (13, 1, 13, 1)$ lies on line ℓ_2
87 : $P_{14754} = (1, 12, 13, 1)$ lies on line ℓ_3
88 : $P_{15439} = (14, 1, 14, 1)$ lies on line ℓ_2
89 : $P_{15874} = (1, 15, 14, 1)$ lies on line ℓ_3
90 : $P_{16464} = (15, 1, 15, 1)$ lies on line ℓ_2
91 : $P_{16866} = (1, 14, 15, 1)$ lies on line ℓ_3
92 : $P_{17489} = (16, 1, 16, 1)$ lies on line ℓ_2
93 : $P_{17986} = (1, 17, 16, 1)$ lies on line ℓ_3
94 : $P_{18514} = (17, 1, 17, 1)$ lies on line ℓ_2
95 : $P_{18978} = (1, 16, 17, 1)$ lies on line ℓ_3
96 : $P_{19539} = (18, 1, 18, 1)$ lies on line ℓ_2
97 : $P_{20098} = (1, 19, 18, 1)$ lies on line ℓ_3
98 : $P_{20564} = (19, 1, 19, 1)$ lies on line ℓ_2
99 : $P_{21090} = (1, 18, 19, 1)$ lies on line ℓ_3
100 : $P_{21589} = (20, 1, 20, 1)$ lies on line ℓ_2
101 : $P_{22210} = (1, 21, 20, 1)$ lies on line ℓ_3
102 : $P_{22614} = (21, 1, 21, 1)$ lies on line ℓ_2
103 : $P_{23202} = (1, 20, 21, 1)$ lies on line ℓ_3
104 : $P_{23639} = (22, 1, 22, 1)$ lies on line ℓ_2
105 : $P_{24322} = (1, 23, 22, 1)$ lies on line ℓ_3
106 : $P_{24664} = (23, 1, 23, 1)$ lies on line ℓ_2
107 : $P_{25314} = (1, 22, 23, 1)$ lies on line ℓ_3
108 : $P_{25689} = (24, 1, 24, 1)$ lies on line ℓ_2
109 : $P_{26434} = (1, 25, 24, 1)$ lies on line ℓ_3
110 : $P_{26714} = (25, 1, 25, 1)$ lies on line ℓ_2
111 : $P_{27426} = (1, 24, 25, 1)$ lies on line ℓ_3
112 : $P_{27739} = (26, 1, 26, 1)$ lies on line ℓ_2
113 : $P_{28546} = (1, 27, 26, 1)$ lies on line ℓ_3
114 : $P_{28764} = (27, 1, 27, 1)$ lies on line ℓ_2
115 : $P_{29538} = (1, 26, 27, 1)$ lies on line ℓ_3
116 : $P_{29789} = (28, 1, 28, 1)$ lies on line ℓ_2
117 : $P_{30658} = (1, 29, 28, 1)$ lies on line ℓ_3
118 : $P_{30814} = (29, 1, 29, 1)$ lies on line ℓ_2
119 : $P_{31650} = (1, 28, 29, 1)$ lies on line ℓ_3
120 : $P_{31839} = (30, 1, 30, 1)$ lies on line ℓ_2
121 : $P_{32770} = (1, 31, 30, 1)$ lies on line ℓ_3
122 : $P_{32864} = (31, 1, 31, 1)$ lies on line ℓ_2
123 : $P_{33762} = (1, 30, 31, 1)$ lies on line ℓ_3

The single points on the surface are:

Points on surface but on no line

The surface has 961 points not on any line:
The points on the surface but not on lines are:

0 : $P_{68} = (1, 1, 1, 0)$
1 : $P_{1133} = (11, 2, 0, 1)$
2 : $P_{1159} = (5, 3, 0, 1)$
3 : $P_{1201} = (15, 4, 0, 1)$
4 : $P_{1235} = (17, 5, 0, 1)$
5 : $P_{1295} = (13, 7, 0, 1)$

$6: P_{1302} = (20, 7, 0, 1)$
$7: P_{1306} = (24, 7, 0, 1)$
$8: P_{1328} = (14, 8, 0, 1)$
$9: P_{1408} = (30, 10, 0, 1)$
$10: P_{1468} = (26, 12, 0, 1)$
$11: P_{1492} = (18, 13, 0, 1)$
$12: P_{1525} = (19, 14, 0, 1)$
$13: P_{1601} = (31, 16, 0, 1)$
$14: P_{1614} = (12, 17, 0, 1)$
$15: P_{1676} = (10, 19, 0, 1)$
$16: P_{1737} = (7, 21, 0, 1)$
$17: P_{1757} = (27, 21, 0, 1)$
$18: P_{1759} = (29, 21, 0, 1)$
$19: P_{1798} = (4, 23, 0, 1)$
$20: P_{1819} = (25, 23, 0, 1)$
$21: P_{1822} = (28, 23, 0, 1)$
$22: P_{1832} = (6, 24, 0, 1)$
$23: P_{1842} = (16, 24, 0, 1)$
$24: P_{1849} = (23, 24, 0, 1)$
$25: P_{1893} = (3, 26, 0, 1)$
$26: P_{1931} = (9, 27, 0, 1)$
$27: P_{1956} = (2, 28, 0, 1)$
$28: P_{1975} = (21, 28, 0, 1)$
$29: P_{1976} = (22, 28, 0, 1)$
$30: P_{2026} = (8, 30, 0, 1)$
$31: P_{2165} = (20, 2, 1, 1)$
$32: P_{2168} = (23, 2, 1, 1)$
$33: P_{2233} = (24, 4, 1, 1)$
$34: P_{2238} = (29, 4, 1, 1)$
$35: P_{2290} = (17, 6, 1, 1)$
$36: P_{2295} = (22, 6, 1, 1)$
$37: P_{2331} = (26, 7, 1, 1)$
$38: P_{2333} = (28, 7, 1, 1)$
$39: P_{2518} = (21, 13, 1, 1)$
$40: P_{2522} = (25, 13, 1, 1)$
$41: P_{2600} = (7, 16, 1, 1)$
$42: P_{2615} = (22, 16, 1, 1)$
$43: P_{2733} = (12, 20, 1, 1)$
$44: P_{2746} = (25, 20, 1, 1)$
$45: P_{2756} = (3, 21, 1, 1)$
$46: P_{2776} = (23, 21, 1, 1)$
$47: P_{2788} = (3, 22, 1, 1)$
$48: P_{2805} = (20, 22, 1, 1)$
$49: P_{2824} = (7, 23, 1, 1)$
$50: P_{2834} = (17, 23, 1, 1)$
$51: P_{2861} = (12, 24, 1, 1)$
$52: P_{2870} = (21, 24, 1, 1)$
$53: P_{2886} = (5, 25, 1, 1)$
$54: P_{2910} = (29, 25, 1, 1)$
$55: P_{2951} = (6, 27, 1, 1)$
$56: P_{2973} = (28, 27, 1, 1)$
$57: P_{2982} = (5, 28, 1, 1)$
$58: P_{3001} = (24, 28, 1, 1)$
$59: P_{3015} = (6, 29, 1, 1)$
$60: P_{3035} = (26, 29, 1, 1)$
$61: P_{3116} = (11, 0, 2, 1)$
$62: P_{3157} = (20, 1, 2, 1)$
$63: P_{3160} = (23, 1, 2, 1)$
$64: P_{3226} = (25, 3, 2, 1)$
$65: P_{3238} = (5, 4, 2, 1)$
$66: P_{3300} = (3, 6, 2, 1)$
$67: P_{3325} = (28, 6, 2, 1)$
$68: P_{3327} = (30, 6, 2, 1)$
$69: P_{3348} = (19, 7, 2, 1)$
$70: P_{3386} = (25, 8, 2, 1)$
$71: P_{3482} = (25, 11, 2, 1)$
$72: P_{3489} = (0, 12, 2, 1)$
$73: P_{3545} = (24, 13, 2, 1)$
$74: P_{3638} = (21, 16, 2, 1)$
$75: P_{3693} = (12, 18, 2, 1)$
$76: P_{3743} = (30, 19, 2, 1)$
$77: P_{3784} = (7, 21, 2, 1)$
$78: P_{3801} = (24, 21, 2, 1)$
$79: P_{3807} = (30, 21, 2, 1)$
$80: P_{3835} = (26, 22, 2, 1)$
$81: P_{3863} = (22, 23, 2, 1)$
$82: P_{3897} = (24, 24, 2, 1)$
$83: P_{3972} = (3, 27, 2, 1)$
$84: P_{4036} = (3, 29, 2, 1)$
$85: P_{4042} = (9, 29, 2, 1)$
$86: P_{4044} = (11, 29, 2, 1)$
$87: P_{4080} = (15, 30, 2, 1)$
$88: P_{4134} = (5, 0, 3, 1)$
$89: P_{4218} = (25, 2, 3, 1)$
$90: P_{4242} = (17, 3, 3, 1)$
$91: P_{4310} = (21, 5, 3, 1)$
$92: P_{4341} = (20, 6, 3, 1)$
$93: P_{4367} = (14, 7, 3, 1)$
$94: P_{4394} = (9, 8, 3, 1)$
$95: P_{4452} = (3, 10, 3, 1)$
$96: P_{4453} = (4, 10, 3, 1)$
$97: P_{4455} = (6, 10, 3, 1)$
$98: P_{4484} = (3, 11, 3, 1)$
$99: P_{4486} = (5, 11, 3, 1)$
$100: P_{4488} = (7, 11, 3, 1)$
$101: P_{4536} = (23, 12, 3, 1)$
$102: P_{4593} = (16, 14, 3, 1)$
$103: P_{4641} = (0, 16, 3, 1)$
$104: P_{4680} = (7, 17, 3, 1)$
$105: P_{4757} = (20, 19, 3, 1)$
$106: P_{4809} = (8, 21, 3, 1)$
$107: P_{4821} = (20, 21, 3, 1)$
$108: P_{4830} = (29, 21, 3, 1)$
$109: P_{4874} = (9, 23, 3, 1)$
$110: P_{4921} = (24, 24, 3, 1)$
$111: P_{4968} = (7, 26, 3, 1)$
$112: P_{5050} = (25, 28, 3, 1)$
$113: P_{5114} = (25, 30, 3, 1)$

$114: P_{5130} = (9, 31, 3, 1)$
$115: P_{5168} = (15, 0, 4, 1)$
$116: P_{5209} = (24, 1, 4, 1)$
$117: P_{5214} = (29, 1, 4, 1)$
$118: P_{5222} = (5, 2, 4, 1)$
$119: P_{5319} = (6, 5, 4, 1)$
$120: P_{5384} = (7, 7, 4, 1)$
$121: P_{5428} = (19, 8, 4, 1)$
$122: P_{5467} = (26, 9, 4, 1)$
$123: P_{5479} = (6, 10, 4, 1)$
$124: P_{5597} = (28, 13, 4, 1)$
$125: P_{5639} = (6, 15, 4, 1)$
$126: P_{5682} = (17, 16, 4, 1)$
$127: P_{5792} = (31, 19, 4, 1)$
$128: P_{5798} = (5, 20, 4, 1)$
$129: P_{5812} = (19, 20, 4, 1)$
$130: P_{5816} = (23, 20, 4, 1)$
$131: P_{5833} = (8, 21, 4, 1)$
$132: P_{5862} = (5, 22, 4, 1)$
$133: P_{5868} = (11, 22, 4, 1)$
$134: P_{5872} = (15, 22, 4, 1)$
$135: P_{5946} = (25, 24, 4, 1)$
$136: P_{5956} = (3, 25, 4, 1)$
$137: P_{5985} = (0, 26, 4, 1)$
$138: P_{6024} = (7, 27, 4, 1)$
$139: P_{6056} = (7, 28, 4, 1)$
$140: P_{6068} = (19, 28, 4, 1)$
$141: P_{6070} = (21, 28, 4, 1)$
$142: P_{6194} = (17, 0, 5, 1)$
$143: P_{6294} = (21, 3, 5, 1)$
$144: P_{6311} = (6, 4, 5, 1)$
$145: P_{6349} = (12, 5, 5, 1)$
$146: P_{6408} = (7, 7, 5, 1)$
$147: P_{6462} = (29, 8, 5, 1)$
$148: P_{6508} = (11, 10, 5, 1)$
$149: P_{6582} = (21, 12, 5, 1)$
$150: P_{6593} = (0, 13, 5, 1)$
$151: P_{6630} = (5, 14, 5, 1)$
$152: P_{6641} = (16, 14, 5, 1)$
$153: P_{6645} = (20, 14, 5, 1)$
$154: P_{6662} = (5, 15, 5, 1)$
$155: P_{6674} = (17, 15, 5, 1)$
$156: P_{6678} = (21, 15, 5, 1)$
$157: P_{6749} = (28, 17, 5, 1)$
$158: P_{6764} = (11, 18, 5, 1)$
$159: P_{6791} = (6, 19, 5, 1)$
$160: P_{6846} = (29, 20, 5, 1)$
$161: P_{6879} = (30, 21, 5, 1)$
$162: P_{6919} = (6, 23, 5, 1)$
$163: P_{6956} = (11, 24, 5, 1)$
$164: P_{7033} = (24, 26, 5, 1)$
$165: P_{7083} = (10, 28, 5, 1)$
$166: P_{7095} = (22, 28, 5, 1)$
$167: P_{7102} = (29, 28, 5, 1)$
$168: P_{7150} = (13, 30, 5, 1)$
$169: P_{7250} = (17, 1, 6, 1)$
$170: P_{7255} = (22, 1, 6, 1)$
$171: P_{7268} = (3, 2, 6, 1)$
$172: P_{7293} = (28, 2, 6, 1)$
$173: P_{7295} = (30, 2, 6, 1)$
$174: P_{7317} = (20, 3, 6, 1)$
$175: P_{7395} = (2, 6, 6, 1)$
$176: P_{7401} = (8, 6, 6, 1)$
$177: P_{7404} = (11, 6, 6, 1)$
$178: P_{7456} = (31, 7, 6, 1)$
$179: P_{7477} = (20, 8, 6, 1)$
$180: P_{7491} = (2, 9, 6, 1)$
$181: P_{7552} = (31, 10, 6, 1)$
$182: P_{7567} = (14, 11, 6, 1)$
$183: P_{7573} = (20, 11, 6, 1)$
$184: P_{7580} = (27, 11, 6, 1)$
$185: P_{7629} = (12, 13, 6, 1)$
$186: P_{7635} = (18, 13, 6, 1)$
$187: P_{7648} = (31, 13, 6, 1)$
$188: P_{7665} = (16, 14, 6, 1)$
$189: P_{7683} = (2, 15, 6, 1)$
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597 : $P_{22533} = (4, 31, 20, 1)$
598 : $P_{22568} = (7, 0, 21, 1)$
599 : $P_{22588} = (27, 0, 21, 1)$
600 : $P_{22590} = (29, 0, 21, 1)$
601 : $P_{22596} = (3, 1, 21, 1)$
602 : $P_{22616} = (23, 1, 21, 1)$
603 : $P_{22632} = (7, 2, 21, 1)$
604 : $P_{22649} = (24, 2, 21, 1)$
605 : $P_{22655} = (30, 2, 21, 1)$
606 : $P_{22665} = (8, 3, 21, 1)$
607 : $P_{22677} = (20, 3, 21, 1)$
608 : $P_{22686} = (29, 3, 21, 1)$
609 : $P_{22697} = (8, 4, 21, 1)$
610 : $P_{22751} = (30, 5, 21, 1)$
611 : $P_{22766} = (13, 6, 21, 1)$
612 : $P_{22776} = (23, 6, 21, 1)$
613 : $P_{22780} = (27, 6, 21, 1)$
614 : $P_{22793} = (8, 7, 21, 1)$
615 : $P_{22808} = (23, 7, 21, 1)$
616 : $P_{22815} = (30, 7, 21, 1)$
617 : $P_{22976} = (31, 12, 21, 1)$
618 : $P_{22997} = (20, 13, 21, 1)$
619 : $P_{23029} = (20, 14, 21, 1)$
620 : $P_{23060} = (19, 15, 21, 1)$
621 : $P_{23094} = (21, 16, 21, 1)$
622 : $P_{23126} = (21, 17, 21, 1)$
623 : $P_{23140} = (3, 18, 21, 1)$
624 : $P_{23172} = (3, 19, 21, 1)$
625 : $P_{23186} = (17, 19, 21, 1)$
626 : $P_{23188} = (19, 19, 21, 1)$
627 : $P_{23219} = (18, 20, 21, 1)$
628 : $P_{23239} = (6, 21, 21, 1)$
629 : $P_{23375} = (14, 25, 21, 1)$
630 : $P_{23415} = (22, 26, 21, 1)$
631 : $P_{23467} = (10, 28, 21, 1)$
632 : $P_{23476} = (19, 28, 21, 1)$
633 : $P_{23481} = (24, 28, 21, 1)$
634 : $P_{23521} = (0, 30, 21, 1)$
635 : $P_{23545} = (24, 30, 21, 1)$
636 : $P_{23546} = (25, 30, 21, 1)$
637 : $P_{23620} = (3, 1, 22, 1)$
638 : $P_{23637} = (20, 1, 22, 1)$
639 : $P_{23675} = (26, 2, 22, 1)$
640 : $P_{23718} = (5, 4, 22, 1)$
641 : $P_{23724} = (11, 4, 22, 1)$
642 : $P_{23728} = (15, 4, 22, 1)$
643 : $P_{23806} = (29, 6, 22, 1)$
644 : $P_{23819} = (10, 7, 22, 1)$
645 : $P_{23843} = (2, 8, 22, 1)$
646 : $P_{23886} = (13, 9, 22, 1)$
647 : $P_{23915} = (10, 10, 22, 1)$
648 : $P_{23921} = (16, 10, 22, 1)$
649 : $P_{23932} = (27, 10, 22, 1)$
650 : $P_{23994} = (25, 12, 22, 1)$
651 : $P_{24008} = (7, 13, 22, 1)$
652 : $P_{24011} = (10, 13, 22, 1)$
653 : $P_{24013} = (12, 13, 22, 1)$

654 : $P_{24064} = (31, 14, 22, 1)$
655 : $P_{24065} = (0, 15, 22, 1)$
656 : $P_{24169} = (8, 18, 22, 1)$
657 : $P_{24177} = (16, 18, 22, 1)$
658 : $P_{24186} = (25, 18, 22, 1)$
659 : $P_{24204} = (11, 19, 22, 1)$
660 : $P_{24231} = (6, 20, 22, 1)$
661 : $P_{24302} = (13, 22, 22, 1)$
662 : $P_{24307} = (18, 22, 22, 1)$
663 : $P_{24319} = (30, 22, 22, 1)$
664 : $P_{24332} = (11, 23, 22, 1)$
665 : $P_{24357} = (4, 24, 22, 1)$
666 : $P_{24369} = (16, 24, 22, 1)$
667 : $P_{24374} = (21, 24, 22, 1)$
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669 : $P_{24590} = (13, 31, 22, 1)$
670 : $P_{24613} = (4, 0, 23, 1)$
671 : $P_{24634} = (25, 0, 23, 1)$
672 : $P_{24637} = (28, 0, 23, 1)$
673 : $P_{24648} = (7, 1, 23, 1)$
674 : $P_{24658} = (17, 1, 23, 1)$
675 : $P_{24695} = (22, 2, 23, 1)$
676 : $P_{24714} = (9, 3, 23, 1)$
677 : $P_{24775} = (6, 5, 23, 1)$
678 : $P_{24865} = (0, 8, 23, 1)$
679 : $P_{24885} = (20, 8, 23, 1)$
680 : $P_{24886} = (21, 8, 23, 1)$
681 : $P_{24939} = (10, 10, 23, 1)$
682 : $P_{24946} = (17, 10, 23, 1)$
683 : $P_{24955} = (26, 10, 23, 1)$
684 : $P_{24978} = (17, 11, 23, 1)$
685 : $P_{25001} = (8, 12, 23, 1)$
686 : $P_{25039} = (14, 13, 23, 1)$
687 : $P_{25129} = (8, 16, 23, 1)$
688 : $P_{25142} = (21, 16, 23, 1)$
689 : $P_{25149} = (28, 16, 23, 1)$
690 : $P_{25167} = (14, 17, 23, 1)$
691 : $P_{25175} = (22, 17, 23, 1)$
692 : $P_{25178} = (25, 17, 23, 1)$
693 : $P_{25195} = (10, 18, 23, 1)$
694 : $P_{25239} = (22, 19, 23, 1)$
695 : $P_{25268} = (19, 20, 23, 1)$
696 : $P_{25324} = (11, 22, 23, 1)$
697 : $P_{25374} = (29, 23, 23, 1)$
698 : $P_{25387} = (10, 24, 23, 1)$
699 : $P_{25398} = (21, 24, 23, 1)$
700 : $P_{25407} = (30, 24, 23, 1)$
701 : $P_{25464} = (23, 26, 23, 1)$
702 : $P_{25496} = (23, 27, 23, 1)$
703 : $P_{25512} = (7, 28, 23, 1)$
704 : $P_{25513} = (8, 28, 23, 1)$
705 : $P_{25519} = (14, 28, 23, 1)$
706 : $P_{25539} = (2, 29, 23, 1)$
707 : $P_{25541} = (4, 29, 23, 1)$
708 : $P_{25544} = (7, 29, 23, 1)$
709 : $P_{25639} = (6, 0, 24, 1)$
710 : $P_{25649} = (16, 0, 24, 1)$
711 : $P_{25656} = (23, 0, 24, 1)$
712 : $P_{25677} = (12, 1, 24, 1)$
713 : $P_{25686} = (21, 1, 24, 1)$
714 : $P_{25721} = (24, 2, 24, 1)$
715 : $P_{25753} = (24, 3, 24, 1)$
716 : $P_{25786} = (25, 4, 24, 1)$
717 : $P_{25804} = (11, 5, 24, 1)$
718 : $P_{25871} = (14, 7, 24, 1)$
719 : $P_{25876} = (19, 7, 24, 1)$
720 : $P_{25885} = (28, 7, 24, 1)$
721 : $P_{25914} = (25, 8, 24, 1)$
722 : $P_{25935} = (14, 9, 24, 1)$
723 : $P_{25953} = (0, 10, 24, 1)$
724 : $P_{25981} = (28, 10, 24, 1)$
725 : $P_{25982} = (29, 10, 24, 1)$
726 : $P_{26023} = (6, 12, 24, 1)$
727 : $P_{26042} = (25, 12, 24, 1)$
728 : $P_{26047} = (30, 12, 24, 1)$
729 : $P_{26059} = (10, 13, 24, 1)$
730 : $P_{26072} = (23, 13, 24, 1)$
731 : $P_{26077} = (28, 13, 24, 1)$
732 : $P_{26084} = (3, 14, 24, 1)$
733 : $P_{26093} = (12, 14, 24, 1)$
734 : $P_{26095} = (14, 14, 24, 1)$
735 : $P_{26125} = (12, 15, 24, 1)$
736 : $P_{26197} = (20, 17, 24, 1)$
737 : $P_{26341} = (4, 22, 24, 1)$
738 : $P_{26353} = (16, 22, 24, 1)$
739 : $P_{26358} = (21, 22, 24, 1)$
740 : $P_{26379} = (10, 23, 24, 1)$
741 : $P_{26390} = (21, 23, 24, 1)$
742 : $P_{26399} = (30, 23, 24, 1)$
743 : $P_{26423} = (22, 24, 24, 1)$
744 : $P_{26448} = (15, 25, 24, 1)$
745 : $P_{26475} = (10, 26, 24, 1)$
746 : $P_{26527} = (30, 27, 24, 1)$
747 : $P_{26569} = (8, 29, 24, 1)$
748 : $P_{26694} = (5, 1, 25, 1)$
749 : $P_{26718} = (29, 1, 25, 1)$
750 : $P_{26788} = (3, 4, 25, 1)$
751 : $P_{26894} = (13, 7, 25, 1)$
752 : $P_{26897} = (16, 7, 25, 1)$
753 : $P_{26909} = (28, 7, 25, 1)$
754 : $P_{26928} = (15, 8, 25, 1)$
755 : $P_{26951} = (6, 9, 25, 1)$
756 : $P_{26955} = (10, 9, 25, 1)$
757 : $P_{26958} = (13, 9, 25, 1)$
758 : $P_{26981} = (4, 10, 25, 1)$
759 : $P_{27036} = (27, 11, 25, 1)$
760 : $P_{27107} = (2, 14, 25, 1)$
761 : $P_{27118} = (13, 14, 25, 1)$

762 : $P_{27119} = (14, 14, 25, 1)$
763 : $P_{27184} = (15, 16, 25, 1)$
764 : $P_{27186} = (17, 16, 25, 1)$
765 : $P_{27200} = (31, 16, 25, 1)$
766 : $P_{27260} = (27, 18, 25, 1)$
767 : $P_{27271} = (6, 19, 25, 1)$
768 : $P_{27319} = (22, 20, 25, 1)$
769 : $P_{27343} = (14, 21, 25, 1)$
770 : $P_{27440} = (15, 24, 25, 1)$
771 : $P_{27466} = (9, 25, 25, 1)$
772 : $P_{27476} = (19, 25, 25, 1)$
773 : $P_{27484} = (27, 25, 25, 1)$
774 : $P_{27495} = (6, 26, 25, 1)$
775 : $P_{27535} = (14, 27, 25, 1)$
776 : $P_{27542} = (21, 27, 25, 1)$
777 : $P_{27547} = (26, 27, 25, 1)$
778 : $P_{27605} = (20, 29, 25, 1)$
779 : $P_{27635} = (18, 30, 25, 1)$
780 : $P_{27649} = (0, 31, 25, 1)$
781 : $P_{27684} = (3, 0, 26, 1)$
782 : $P_{27784} = (7, 3, 26, 1)$
783 : $P_{27809} = (0, 4, 26, 1)$
784 : $P_{27865} = (24, 5, 26, 1)$
785 : $P_{27911} = (6, 7, 26, 1)$
786 : $P_{27924} = (19, 7, 26, 1)$
787 : $P_{27925} = (20, 7, 26, 1)$
788 : $P_{27939} = (2, 8, 26, 1)$
789 : $P_{27962} = (25, 8, 26, 1)$
790 : $P_{27963} = (26, 8, 26, 1)$
791 : $P_{27972} = (3, 9, 26, 1)$
792 : $P_{27993} = (24, 9, 26, 1)$
793 : $P_{27995} = (26, 9, 26, 1)$
794 : $P_{28005} = (4, 10, 26, 1)$
795 : $P_{28089} = (24, 12, 26, 1)$
796 : $P_{28151} = (22, 14, 26, 1)$
797 : $P_{28179} = (18, 15, 26, 1)$
798 : $P_{28253} = (28, 17, 26, 1)$
799 : $P_{28307} = (18, 19, 26, 1)$
800 : $P_{28375} = (22, 21, 26, 1)$
801 : $P_{28440} = (23, 23, 26, 1)$
802 : $P_{28459} = (10, 24, 26, 1)$
803 : $P_{28487} = (6, 25, 26, 1)$
804 : $P_{28518} = (5, 26, 26, 1)$
805 : $P_{28567} = (22, 27, 26, 1)$
806 : $P_{28595} = (18, 28, 26, 1)$
807 : $P_{28647} = (6, 30, 26, 1)$
808 : $P_{28714} = (9, 0, 27, 1)$
809 : $P_{28743} = (6, 1, 27, 1)$
810 : $P_{28765} = (28, 1, 27, 1)$
811 : $P_{28772} = (3, 2, 27, 1)$
812 : $P_{28840} = (7, 4, 27, 1)$
813 : $P_{28943} = (14, 7, 27, 1)$
814 : $P_{28952} = (23, 7, 27, 1)$
815 : $P_{28953} = (24, 7, 27, 1)$
816 : $P_{29015} = (22, 9, 27, 1)$
817 : $P_{29147} = (26, 13, 27, 1)$
818 : $P_{29164} = (11, 14, 27, 1)$
819 : $P_{29240} = (23, 16, 27, 1)$
820 : $P_{29249} = (0, 17, 27, 1)$
821 : $P_{29335} = (22, 19, 27, 1)$
822 : $P_{29354} = (9, 20, 27, 1)$
823 : $P_{29363} = (18, 20, 27, 1)$
824 : $P_{29371} = (26, 20, 27, 1)$
825 : $P_{29464} = (23, 23, 27, 1)$
826 : $P_{29503} = (30, 24, 27, 1)$
827 : $P_{29519} = (14, 25, 27, 1)$
828 : $P_{29526} = (21, 25, 27, 1)$
829 : $P_{29531} = (26, 25, 27, 1)$
830 : $P_{29559} = (22, 26, 27, 1)$
831 : $P_{29630} = (29, 28, 27, 1)$
832 : $P_{29645} = (12, 29, 27, 1)$
833 : $P_{29679} = (14, 30, 27, 1)$
834 : $P_{29714} = (17, 31, 27, 1)$
835 : $P_{29731} = (2, 0, 28, 1)$
836 : $P_{29750} = (21, 0, 28, 1)$
837 : $P_{29751} = (22, 0, 28, 1)$
838 : $P_{29766} = (5, 1, 28, 1)$
839 : $P_{29785} = (24, 1, 28, 1)$
840 : $P_{29850} = (25, 3, 28, 1)$
841 : $P_{29864} = (7, 4, 28, 1)$
842 : $P_{29876} = (19, 4, 28, 1)$
843 : $P_{29878} = (21, 4, 28, 1)$
844 : $P_{29899} = (10, 5, 28, 1)$
845 : $P_{29911} = (22, 5, 28, 1)$
846 : $P_{29918} = (29, 5, 28, 1)$
847 : $P_{29951} = (30, 6, 28, 1)$
848 : $P_{29990} = (5, 8, 28, 1)$
849 : $P_{29993} = (8, 8, 28, 1)$
850 : $P_{29997} = (12, 8, 28, 1)$
851 : $P_{30022} = (5, 9, 28, 1)$
852 : $P_{30141} = (28, 12, 28, 1)$
853 : $P_{30173} = (28, 13, 28, 1)$
854 : $P_{30251} = (10, 16, 28, 1)$
855 : $P_{30292} = (19, 17, 28, 1)$
856 : $P_{30337} = (0, 19, 28, 1)$
857 : $P_{30343} = (6, 19, 28, 1)$
858 : $P_{30344} = (7, 19, 28, 1)$
859 : $P_{30371} = (2, 20, 28, 1)$
860 : $P_{30393} = (24, 20, 28, 1)$
861 : $P_{30396} = (27, 20, 28, 1)$
862 : $P_{30411} = (10, 21, 28, 1)$
863 : $P_{30420} = (19, 21, 28, 1)$
864 : $P_{30425} = (24, 21, 28, 1)$
865 : $P_{30472} = (7, 23, 28, 1)$
866 : $P_{30473} = (8, 23, 28, 1)$
867 : $P_{30479} = (14, 23, 28, 1)$
868 : $P_{30579} = (18, 26, 28, 1)$
869 : $P_{30622} = (29, 27, 28, 1)$

870 : $P_{30645} = (20, 28, 28, 1)$
871 : $P_{30666} = (9, 29, 28, 1)$
872 : $P_{30718} = (29, 30, 28, 1)$
873 : $P_{30729} = (8, 31, 28, 1)$
874 : $P_{30791} = (6, 1, 29, 1)$
875 : $P_{30811} = (26, 1, 29, 1)$
876 : $P_{30820} = (3, 2, 29, 1)$
877 : $P_{30826} = (9, 2, 29, 1)$
878 : $P_{30828} = (11, 2, 29, 1)$
879 : $P_{30970} = (25, 6, 29, 1)$
880 : $P_{31013} = (4, 8, 29, 1)$
881 : $P_{31017} = (8, 8, 29, 1)$
882 : $P_{31022} = (13, 8, 29, 1)$
883 : $P_{31088} = (15, 10, 29, 1)$
884 : $P_{31105} = (0, 11, 29, 1)$
885 : $P_{31223} = (22, 14, 29, 1)$
886 : $P_{31249} = (16, 15, 29, 1)$
887 : $P_{31273} = (8, 16, 29, 1)$
888 : $P_{31282} = (17, 16, 29, 1)$
889 : $P_{31289} = (24, 16, 29, 1)$
890 : $P_{31319} = (22, 17, 29, 1)$
891 : $P_{31345} = (16, 18, 29, 1)$
892 : $P_{31388} = (27, 19, 29, 1)$
893 : $P_{31491} = (2, 23, 29, 1)$
894 : $P_{31493} = (4, 23, 29, 1)$
895 : $P_{31496} = (7, 23, 29, 1)$
896 : $P_{31529} = (8, 24, 29, 1)$
897 : $P_{31573} = (20, 25, 29, 1)$
898 : $P_{31629} = (12, 27, 29, 1)$
899 : $P_{31658} = (9, 28, 29, 1)$
900 : $P_{31695} = (14, 29, 29, 1)$
901 : $P_{31697} = (16, 29, 29, 1)$
902 : $P_{31712} = (31, 29, 29, 1)$
903 : $P_{31722} = (9, 30, 29, 1)$
904 : $P_{31749} = (4, 31, 29, 1)$
905 : $P_{31764} = (19, 31, 29, 1)$
906 : $P_{31767} = (22, 31, 29, 1)$
907 : $P_{31785} = (8, 0, 30, 1)$
908 : $P_{31856} = (15, 2, 30, 1)$
909 : $P_{31898} = (25, 3, 30, 1)$
910 : $P_{31950} = (13, 5, 30, 1)$
911 : $P_{31973} = (4, 6, 30, 1)$
912 : $P_{31996} = (27, 6, 30, 1)$
913 : $P_{31999} = (30, 6, 30, 1)$
914 : $P_{32006} = (5, 7, 30, 1)$
915 : $P_{32027} = (26, 7, 30, 1)$
916 : $P_{32031} = (30, 7, 30, 1)$
917 : $P_{32073} = (8, 9, 30, 1)$
918 : $P_{32084} = (19, 9, 30, 1)$
919 : $P_{32091} = (26, 9, 30, 1)$
920 : $P_{32192} = (31, 12, 30, 1)$
921 : $P_{32222} = (29, 13, 30, 1)$
922 : $P_{32251} = (26, 14, 30, 1)$
923 : $P_{32280} = (23, 15, 30, 1)$
924 : $P_{32334} = (13, 17, 30, 1)$
925 : $P_{32338} = (17, 17, 30, 1)$
926 : $P_{32350} = (29, 17, 30, 1)$
927 : $P_{32388} = (3, 19, 30, 1)$
928 : $P_{32430} = (13, 20, 30, 1)$
929 : $P_{32449} = (0, 21, 30, 1)$
930 : $P_{32473} = (24, 21, 30, 1)$
931 : $P_{32474} = (25, 21, 30, 1)$
932 : $P_{32506} = (25, 22, 30, 1)$
933 : $P_{32595} = (18, 25, 30, 1)$
934 : $P_{32615} = (6, 26, 30, 1)$
935 : $P_{32655} = (14, 27, 30, 1)$
936 : $P_{32702} = (29, 28, 30, 1)$
937 : $P_{32714} = (9, 29, 30, 1)$
938 : $P_{32758} = (21, 30, 30, 1)$
939 : $P_{32785} = (16, 31, 30, 1)$
940 : $P_{32906} = (9, 3, 31, 1)$
941 : $P_{33051} = (26, 7, 31, 1)$
942 : $P_{33093} = (4, 9, 31, 1)$
943 : $P_{33135} = (14, 10, 31, 1)$
944 : $P_{33138} = (17, 10, 31, 1)$
945 : $P_{33151} = (30, 10, 31, 1)$
946 : $P_{33180} = (27, 11, 31, 1)$
947 : $P_{33333} = (20, 16, 31, 1)$
948 : $P_{33357} = (12, 17, 31, 1)$
949 : $P_{33362} = (17, 17, 31, 1)$
950 : $P_{33373} = (28, 17, 31, 1)$
951 : $P_{33433} = (24, 19, 31, 1)$
952 : $P_{33445} = (4, 20, 31, 1)$
953 : $P_{33518} = (13, 22, 31, 1)$
954 : $P_{33601} = (0, 25, 31, 1)$
955 : $P_{33682} = (17, 27, 31, 1)$
956 : $P_{33705} = (8, 28, 31, 1)$
957 : $P_{33733} = (4, 29, 31, 1)$
958 : $P_{33748} = (19, 29, 31, 1)$
959 : $P_{33751} = (22, 29, 31, 1)$
960 : $P_{33777} = (16, 30, 31, 1)$

Line Intersection Graph

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

Neighbor sets in the line intersection graph:
Line 0 intersects

Line	ℓ_1	ℓ_2	ℓ_3
in point	P_5	P_{36}	P_{67}

Line 1 intersects

Line	ℓ_0	ℓ_2
in point	P_5	P_4

Line 2 intersects

Line	ℓ_0	ℓ_1
in point	P_{36}	P_4

Line 3 intersects

Line	ℓ_0
in point	P_{67}

The surface has 1089 points:
Too many to print.