Rank-74055 over GF(32)

January 15, 2021

The equation

The equation of the surface is :

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

(0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(32) is -2112845787

General information

Number of lines	4
Number of points	1089
Number of singular points	1
Number of Eckardt points	1
Number of double points	1
Number of single points	127
Number of points off lines	960
Number of Hesse planes	0
Number of axes	0
Type of points on lines	33^4
Type of lines on points	3, 2, 1^{127}, 0^{960}

Singular Points

The surface has 1 singular points:

$0 : P_{2114} = \mathbf{P}(0, 1, 1, 1) = \mathbf{P}(0, 1, 1, 1)$

The 4 Lines

The lines and their Pluecker coordinates are:

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

$$\ell_1 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{1082400} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{1082400} = \mathbf{Pl}(0,0,0,1,0,0)_{65}$$

$$\ell_2 = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \end{bmatrix}_{33824} = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \end{bmatrix}_{33824} = \mathbf{Pl}(1,0,0,1,0,0)_{66}$$

$$\ell_3 = \begin{bmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{1082433} = \begin{bmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{1082433} = \mathbf{Pl}(0,1,0,1,0,0)_{97}$$

Rank of lines: (0, 1082400, 33824, 1082433)
Rank of points on Klein quadric: (0, 65, 66, 97)

Eckardt Points

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

Double Points

The surface has 1 Double points:
The double points on the surface are:

$P_3 = (0,0,0,1) = \ell_1 \cap \ell_3$

Single Points

The surface has 127 single points:
The single points on the surface are:

$0 : P_0 = (1,0,0,0)$ lies on line ℓ_0
$1 : P_5 = (1,1,0,0)$ lies on line ℓ_0
$2 : P_6 = (2,1,0,0)$ lies on line ℓ_0
$3 : P_7 = (3,1,0,0)$ lies on line ℓ_0
$4 : P_8 = (4,1,0,0)$ lies on line ℓ_0
$5 : P_9 = (5,1,0,0)$ lies on line ℓ_0
$6 : P_{10} = (6,1,0,0)$ lies on line ℓ_0
$7 : P_{11} = (7,1,0,0)$ lies on line ℓ_0
$8 : P_{12} = (8,1,0,0)$ lies on line ℓ_0
$9 : P_{13} = (9,1,0,0)$ lies on line ℓ_0
$10 : P_{14} = (10,1,0,0)$ lies on line ℓ_0
$11 : P_{15} = (11,1,0,0)$ lies on line ℓ_0
$12 : P_{16} = (12,1,0,0)$ lies on line ℓ_0
$13 : P_{17} = (13,1,0,0)$ lies on line ℓ_0
$14 : P_{18} = (14,1,0,0)$ lies on line ℓ_0
$15 : P_{19} = (15,1,0,0)$ lies on line ℓ_0
$16 : P_{20} = (16,1,0,0)$ lies on line ℓ_0
$17 : P_{21} = (17,1,0,0)$ lies on line ℓ_0
$18 : P_{22} = (18,1,0,0)$ lies on line ℓ_0
$19 : P_{23} = (19,1,0,0)$ lies on line ℓ_0
$20 : P_{24} = (20,1,0,0)$ lies on line ℓ_0
$21 : P_{25} = (21,1,0,0)$ lies on line ℓ_0
$22 : P_{26} = (22,1,0,0)$ lies on line ℓ_0

$23 : P_{27} = (23,1,0,0)$ lies on line ℓ_0
$24 : P_{28} = (24,1,0,0)$ lies on line ℓ_0
$25 : P_{29} = (25,1,0,0)$ lies on line ℓ_0
$26 : P_{30} = (26,1,0,0)$ lies on line ℓ_0
$27 : P_{31} = (27,1,0,0)$ lies on line ℓ_0
$28 : P_{32} = (28,1,0,0)$ lies on line ℓ_0
$29 : P_{33} = (29,1,0,0)$ lies on line ℓ_0
$30 : P_{34} = (30,1,0,0)$ lies on line ℓ_0
$31 : P_{35} = (31,1,0,0)$ lies on line ℓ_0
$32 : P_{67} = (0,1,1,0)$ lies on line ℓ_3
$33 : P_{1059} = (1,0,0,1)$ lies on line ℓ_2
$34 : P_{1090} = (0,1,0,1)$ lies on line ℓ_1
$35 : P_{1091} = (1,1,0,1)$ lies on line ℓ_2
$36 : P_{1122} = (0,2,0,1)$ lies on line ℓ_1
$37 : P_{1123} = (1,2,0,1)$ lies on line ℓ_2
$38 : P_{1154} = (0,3,0,1)$ lies on line ℓ_1
$39 : P_{1155} = (1,3,0,1)$ lies on line ℓ_2
$40 : P_{1186} = (0,4,0,1)$ lies on line ℓ_1
$41 : P_{1187} = (1,4,0,1)$ lies on line ℓ_2
$42 : P_{1218} = (0,5,0,1)$ lies on line ℓ_1
$43 : P_{1219} = (1,5,0,1)$ lies on line ℓ_2
$44 : P_{1250} = (0,6,0,1)$ lies on line ℓ_1
$45 : P_{1251} = (1,6,0,1)$ lies on line ℓ_2

46 : $P_{1282} = (0, 7, 0, 1)$ lies on line ℓ_1
47 : $P_{1283} = (1, 7, 0, 1)$ lies on line ℓ_2
48 : $P_{1314} = (0, 8, 0, 1)$ lies on line ℓ_1
49 : $P_{1315} = (1, 8, 0, 1)$ lies on line ℓ_2
50 : $P_{1346} = (0, 9, 0, 1)$ lies on line ℓ_1
51 : $P_{1347} = (1, 9, 0, 1)$ lies on line ℓ_2
52 : $P_{1378} = (0, 10, 0, 1)$ lies on line ℓ_1
53 : $P_{1379} = (1, 10, 0, 1)$ lies on line ℓ_2
54 : $P_{1410} = (0, 11, 0, 1)$ lies on line ℓ_1
55 : $P_{1411} = (1, 11, 0, 1)$ lies on line ℓ_2
56 : $P_{1442} = (0, 12, 0, 1)$ lies on line ℓ_1
57 : $P_{1443} = (1, 12, 0, 1)$ lies on line ℓ_2
58 : $P_{1474} = (0, 13, 0, 1)$ lies on line ℓ_1
59 : $P_{1475} = (1, 13, 0, 1)$ lies on line ℓ_2
60 : $P_{1506} = (0, 14, 0, 1)$ lies on line ℓ_1
61 : $P_{1507} = (1, 14, 0, 1)$ lies on line ℓ_2
62 : $P_{1538} = (0, 15, 0, 1)$ lies on line ℓ_1
63 : $P_{1539} = (1, 15, 0, 1)$ lies on line ℓ_2
64 : $P_{1570} = (0, 16, 0, 1)$ lies on line ℓ_1
65 : $P_{1571} = (1, 16, 0, 1)$ lies on line ℓ_2
66 : $P_{1602} = (0, 17, 0, 1)$ lies on line ℓ_1
67 : $P_{1603} = (1, 17, 0, 1)$ lies on line ℓ_2
68 : $P_{1634} = (0, 18, 0, 1)$ lies on line ℓ_1
69 : $P_{1635} = (1, 18, 0, 1)$ lies on line ℓ_2
70 : $P_{1666} = (0, 19, 0, 1)$ lies on line ℓ_1
71 : $P_{1667} = (1, 19, 0, 1)$ lies on line ℓ_2
72 : $P_{1698} = (0, 20, 0, 1)$ lies on line ℓ_1
73 : $P_{1699} = (1, 20, 0, 1)$ lies on line ℓ_2
74 : $P_{1730} = (0, 21, 0, 1)$ lies on line ℓ_1
75 : $P_{1731} = (1, 21, 0, 1)$ lies on line ℓ_2
76 : $P_{1762} = (0, 22, 0, 1)$ lies on line ℓ_1
77 : $P_{1763} = (1, 22, 0, 1)$ lies on line ℓ_2
78 : $P_{1794} = (0, 23, 0, 1)$ lies on line ℓ_1
79 : $P_{1795} = (1, 23, 0, 1)$ lies on line ℓ_2
80 : $P_{1826} = (0, 24, 0, 1)$ lies on line ℓ_1
81 : $P_{1827} = (1, 24, 0, 1)$ lies on line ℓ_2
82 : $P_{1858} = (0, 25, 0, 1)$ lies on line ℓ_1
83 : $P_{1859} = (1, 25, 0, 1)$ lies on line ℓ_2
84 : $P_{1890} = (0, 26, 0, 1)$ lies on line ℓ_1
85 : $P_{1891} = (1, 26, 0, 1)$ lies on line ℓ_2
86 : $P_{1922} = (0, 27, 0, 1)$ lies on line ℓ_1

87 : $P_{1923} = (1, 27, 0, 1)$ lies on line ℓ_2
88 : $P_{1954} = (0, 28, 0, 1)$ lies on line ℓ_1
89 : $P_{1955} = (1, 28, 0, 1)$ lies on line ℓ_2
90 : $P_{1986} = (0, 29, 0, 1)$ lies on line ℓ_1
91 : $P_{1987} = (1, 29, 0, 1)$ lies on line ℓ_2
92 : $P_{2018} = (0, 30, 0, 1)$ lies on line ℓ_1
93 : $P_{2019} = (1, 30, 0, 1)$ lies on line ℓ_2
94 : $P_{2050} = (0, 31, 0, 1)$ lies on line ℓ_1
95 : $P_{2051} = (1, 31, 0, 1)$ lies on line ℓ_2
96 : $P_{2114} = (0, 1, 1, 1)$ lies on line ℓ_3
97 : $P_{3169} = (0, 2, 2, 1)$ lies on line ℓ_3
98 : $P_{4225} = (0, 3, 3, 1)$ lies on line ℓ_3
99 : $P_{5281} = (0, 4, 4, 1)$ lies on line ℓ_3
100 : $P_{6337} = (0, 5, 5, 1)$ lies on line ℓ_3
101 : $P_{7393} = (0, 6, 6, 1)$ lies on line ℓ_3
102 : $P_{8449} = (0, 7, 7, 1)$ lies on line ℓ_3
103 : $P_{9505} = (0, 8, 8, 1)$ lies on line ℓ_3
104 : $P_{10561} = (0, 9, 9, 1)$ lies on line ℓ_3
105 : $P_{11617} = (0, 10, 10, 1)$ lies on line ℓ_3
106 : $P_{12673} = (0, 11, 11, 1)$ lies on line ℓ_3
107 : $P_{13729} = (0, 12, 12, 1)$ lies on line ℓ_3
108 : $P_{14785} = (0, 13, 13, 1)$ lies on line ℓ_3
109 : $P_{15841} = (0, 14, 14, 1)$ lies on line ℓ_3
110 : $P_{16897} = (0, 15, 15, 1)$ lies on line ℓ_3
111 : $P_{17953} = (0, 16, 16, 1)$ lies on line ℓ_3
112 : $P_{19009} = (0, 17, 17, 1)$ lies on line ℓ_3
113 : $P_{20065} = (0, 18, 18, 1)$ lies on line ℓ_3
114 : $P_{21121} = (0, 19, 19, 1)$ lies on line ℓ_3
115 : $P_{22177} = (0, 20, 20, 1)$ lies on line ℓ_3
116 : $P_{23233} = (0, 21, 21, 1)$ lies on line ℓ_3
117 : $P_{24289} = (0, 22, 22, 1)$ lies on line ℓ_3
118 : $P_{25345} = (0, 23, 23, 1)$ lies on line ℓ_3
119 : $P_{26401} = (0, 24, 24, 1)$ lies on line ℓ_3
120 : $P_{27457} = (0, 25, 25, 1)$ lies on line ℓ_3
121 : $P_{28513} = (0, 26, 26, 1)$ lies on line ℓ_3
122 : $P_{29569} = (0, 27, 27, 1)$ lies on line ℓ_3
123 : $P_{30625} = (0, 28, 28, 1)$ lies on line ℓ_3
124 : $P_{31681} = (0, 29, 29, 1)$ lies on line ℓ_3
125 : $P_{32737} = (0, 30, 30, 1)$ lies on line ℓ_3
126 : $P_{33793} = (0, 31, 31, 1)$ lies on line ℓ_3

The single points on the surface are:

Points on surface but on no line

The surface has 960 points not on any line:
The points on the surface but not on lines are:

0 : $P_{115} = (16, 2, 1, 0)$
1 : $P_{162} = (31, 3, 1, 0)$
2 : $P_{176} = (13, 4, 1, 0)$

3 : $P_{213} = (18, 5, 1, 0)$
4 : $P_{235} = (8, 6, 1, 0)$
5 : $P_{270} = (11, 7, 1, 0)$

$6: P_{321} = (30, 8, 1, 0)$
$7: P_{336} = (13, 9, 1, 0)$
$8: P_{374} = (19, 10, 1, 0)$
$9: P_{414} = (27, 11, 1, 0)$
$10: P_{430} = (11, 12, 1, 0)$
$11: P_{453} = (2, 13, 1, 0)$
$12: P_{491} = (8, 14, 1, 0)$
$13: P_{517} = (2, 15, 1, 0)$
$14: P_{574} = (27, 16, 1, 0)$
$15: P_{588} = (9, 17, 1, 0)$
$16: P_{627} = (16, 18, 1, 0)$
$17: P_{657} = (14, 19, 1, 0)$
$18: P_{685} = (10, 20, 1, 0)$
$19: P_{722} = (15, 21, 1, 0)$
$20: P_{769} = (30, 22, 1, 0)$
$21: P_{789} = (18, 23, 1, 0)$
$22: P_{812} = (9, 24, 1, 0)$
$23: P_{854} = (19, 25, 1, 0)$
$24: P_{882} = (15, 26, 1, 0)$
$25: P_{903} = (4, 27, 1, 0)$
$26: P_{962} = (31, 28, 1, 0)$
$27: P_{977} = (14, 29, 1, 0)$
$28: P_{1005} = (10, 30, 1, 0)$
$29: P_{1031} = (4, 31, 1, 0)$
$30: P_{3161} = (24, 1, 2, 1)$
$31: P_{3164} = (27, 1, 2, 1)$
$32: P_{3174} = (5, 2, 2, 1)$
$33: P_{3334} = (5, 7, 2, 1)$
$34: P_{3339} = (10, 7, 2, 1)$
$35: P_{3426} = (1, 10, 2, 1)$
$36: P_{3445} = (20, 10, 2, 1)$
$37: P_{3458} = (1, 11, 2, 1)$
$38: P_{3479} = (22, 11, 2, 1)$
$39: P_{3531} = (10, 13, 2, 1)$
$40: P_{3538} = (17, 13, 2, 1)$
$41: P_{3660} = (11, 17, 2, 1)$
$42: P_{3662} = (13, 17, 2, 1)$
$43: P_{3693} = (12, 18, 2, 1)$
$44: P_{3717} = (4, 19, 2, 1)$
$45: P_{3719} = (6, 19, 2, 1)$
$46: P_{3783} = (6, 21, 2, 1)$
$47: P_{3785} = (8, 21, 2, 1)$
$48: P_{3845} = (4, 23, 2, 1)$
$49: P_{3855} = (14, 23, 2, 1)$
$50: P_{3919} = (14, 25, 2, 1)$
$51: P_{3929} = (24, 25, 2, 1)$
$52: P_{3948} = (11, 26, 2, 1)$
$53: P_{3964} = (27, 26, 2, 1)$
$54: P_{4014} = (13, 28, 2, 1)$
$55: P_{4018} = (17, 28, 2, 1)$
$56: P_{4041} = (8, 29, 2, 1)$
$57: P_{4055} = (22, 29, 2, 1)$
$58: P_{4077} = (12, 30, 2, 1)$
$59: P_{4085} = (20, 30, 2, 1)$

$60: P_{4151} = (22, 0, 3, 1)$
$61: P_{4152} = (23, 0, 3, 1)$
$62: P_{4218} = (25, 2, 3, 1)$
$63: P_{4223} = (30, 2, 3, 1)$
$64: P_{4229} = (4, 3, 3, 1)$
$65: P_{4306} = (17, 5, 3, 1)$
$66: P_{4320} = (31, 5, 3, 1)$
$67: P_{4357} = (4, 7, 3, 1)$
$68: P_{4365} = (12, 7, 3, 1)$
$69: P_{4454} = (5, 10, 3, 1)$
$70: P_{4475} = (26, 10, 3, 1)$
$71: P_{4493} = (12, 11, 3, 1)$
$72: P_{4497} = (16, 11, 3, 1)$
$73: P_{4614} = (5, 15, 3, 1)$
$74: P_{4630} = (21, 15, 3, 1)$
$75: P_{4655} = (14, 16, 3, 1)$
$76: P_{4667} = (26, 16, 3, 1)$
$77: P_{4778} = (9, 20, 3, 1)$
$78: P_{4786} = (17, 20, 3, 1)$
$79: P_{4841} = (8, 22, 3, 1)$
$80: P_{4855} = (22, 22, 3, 1)$
$81: P_{4875} = (10, 23, 3, 1)$
$82: P_{4888} = (23, 23, 3, 1)$
$83: P_{4982} = (21, 26, 3, 1)$
$84: P_{4992} = (31, 26, 3, 1)$
$85: P_{5009} = (16, 27, 3, 1)$
$86: P_{5018} = (25, 27, 3, 1)$
$87: P_{5055} = (30, 28, 3, 1)$
$88: P_{5066} = (9, 29, 3, 1)$
$89: P_{5067} = (10, 29, 3, 1)$
$90: P_{5097} = (8, 30, 3, 1)$
$91: P_{5103} = (14, 30, 3, 1)$
$92: P_{5187} = (2, 1, 4, 1)$
$93: P_{5192} = (7, 1, 4, 1)$
$94: P_{5251} = (2, 3, 4, 1)$
$95: P_{5264} = (15, 3, 4, 1)$
$96: P_{5298} = (17, 4, 4, 1)$
$97: P_{5352} = (7, 6, 4, 1)$
$98: P_{5375} = (30, 6, 4, 1)$
$99: P_{5425} = (16, 8, 4, 1)$
$100: P_{5429} = (20, 8, 4, 1)$
$101: P_{5467} = (26, 9, 4, 1)$
$102: P_{5552} = (15, 12, 4, 1)$
$103: P_{5564} = (27, 12, 4, 1)$
$104: P_{5602} = (1, 14, 4, 1)$
$105: P_{5630} = (29, 14, 4, 1)$
$106: P_{5634} = (1, 15, 4, 1)$
$107: P_{5658} = (25, 15, 4, 1)$
$108: P_{5787} = (26, 19, 4, 1)$
$109: P_{5790} = (29, 19, 4, 1)$
$110: P_{5839} = (14, 21, 4, 1)$
$111: P_{5842} = (17, 21, 4, 1)$
$112: P_{5867} = (10, 22, 4, 1)$
$113: P_{5882} = (25, 22, 4, 1)$

$114: P_{5901} = (12, 23, 4, 1)$
$115: P_{5916} = (27, 23, 4, 1)$
$116: P_{5937} = (16, 24, 4, 1)$
$117: P_{5951} = (30, 24, 4, 1)$
$118: P_{6029} = (12, 27, 4, 1)$
$119: P_{6031} = (14, 27, 4, 1)$
$120: P_{6059} = (10, 28, 4, 1)$
$121: P_{6069} = (20, 28, 4, 1)$
$122: P_{6201} = (24, 0, 5, 1)$
$123: P_{6202} = (25, 0, 5, 1)$
$124: P_{6247} = (6, 2, 5, 1)$
$125: P_{6254} = (13, 2, 5, 1)$
$126: P_{6291} = (18, 3, 5, 1)$
$127: P_{6301} = (28, 3, 5, 1)$
$128: P_{6311} = (6, 4, 5, 1)$
$129: P_{6324} = (19, 4, 5, 1)$
$130: P_{6353} = (16, 5, 5, 1)$
$131: P_{6596} = (3, 13, 5, 1)$
$132: P_{6623} = (30, 13, 5, 1)$
$133: P_{6628} = (3, 14, 5, 1)$
$134: P_{6642} = (17, 14, 5, 1)$
$135: P_{6670} = (13, 15, 5, 1)$
$136: P_{6683} = (26, 15, 5, 1)$
$137: P_{6733} = (12, 17, 5, 1)$
$138: P_{6739} = (18, 17, 5, 1)$
$139: P_{6795} = (10, 19, 5, 1)$
$140: P_{6815} = (30, 19, 5, 1)$
$141: P_{6865} = (16, 21, 5, 1)$
$142: P_{6875} = (26, 21, 5, 1)$
$143: P_{6892} = (11, 22, 5, 1)$
$144: P_{6895} = (14, 22, 5, 1)$
$145: P_{6932} = (19, 23, 5, 1)$
$146: P_{6959} = (14, 24, 5, 1)$
$147: P_{6969} = (24, 24, 5, 1)$
$148: P_{6987} = (10, 25, 5, 1)$
$149: P_{7002} = (25, 25, 5, 1)$
$150: P_{7116} = (11, 29, 5, 1)$
$151: P_{7117} = (12, 29, 5, 1)$
$152: P_{7186} = (17, 31, 5, 1)$
$153: P_{7197} = (28, 31, 5, 1)$
$154: P_{7242} = (9, 1, 6, 1)$
$155: P_{7247} = (14, 1, 6, 1)$
$156: P_{7282} = (17, 2, 6, 1)$
$157: P_{7293} = (28, 2, 6, 1)$
$158: P_{7330} = (1, 4, 6, 1)$
$159: P_{7353} = (24, 4, 6, 1)$
$160: P_{7362} = (1, 5, 6, 1)$
$161: P_{7391} = (30, 5, 6, 1)$
$162: P_{7414} = (21, 6, 6, 1)$
$163: P_{7433} = (8, 7, 6, 1)$
$164: P_{7452} = (27, 7, 6, 1)$
$165: P_{7466} = (9, 8, 6, 1)$
$166: P_{7486} = (29, 8, 6, 1)$
$167: P_{7636} = (19, 13, 6, 1)$

$168: P_{7642} = (25, 13, 6, 1)$
$169: P_{7671} = (22, 14, 6, 1)$
$170: P_{7689} = (8, 15, 6, 1)$
$171: P_{7695} = (14, 15, 6, 1)$
$172: P_{7826} = (17, 19, 6, 1)$
$173: P_{7830} = (21, 19, 6, 1)$
$174: P_{7856} = (15, 20, 6, 1)$
$175: P_{7866} = (25, 20, 6, 1)$
$176: P_{7886} = (13, 21, 6, 1)$
$177: P_{7902} = (29, 21, 6, 1)$
$178: P_{7982} = (13, 24, 6, 1)$
$179: P_{7991} = (22, 24, 6, 1)$
$180: P_{8080} = (15, 27, 6, 1)$
$181: P_{8095} = (30, 27, 6, 1)$
$182: P_{8121} = (24, 28, 6, 1)$
$183: P_{8124} = (27, 28, 6, 1)$
$184: P_{8180} = (19, 30, 6, 1)$
$185: P_{8189} = (28, 30, 6, 1)$
$186: P_{8235} = (10, 0, 7, 1)$
$187: P_{8236} = (11, 0, 7, 1)$
$188: P_{8355} = (2, 4, 7, 1)$
$189: P_{8384} = (31, 4, 7, 1)$
$190: P_{8419} = (2, 6, 7, 1)$
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$598: P_{22153} = (8, 19, 20, 1)$
$599: P_{22168} = (23, 19, 20, 1)$

$600: P_{22205} = (28, 20, 20, 1)$
$601: P_{22211} = (2, 21, 20, 1)$
$602: P_{22219} = (10, 21, 20, 1)$
$603: P_{22275} = (2, 23, 20, 1)$
$604: P_{22280} = (7, 23, 20, 1)$
$605: P_{22407} = (6, 27, 20, 1)$
$606: P_{22409} = (8, 27, 20, 1)$
$607: P_{22455} = (22, 28, 20, 1)$
$608: P_{22460} = (27, 28, 20, 1)$
$609: P_{22471} = (6, 29, 20, 1)$
$610: P_{22496} = (31, 29, 20, 1)$
$611: P_{22522} = (25, 30, 20, 1)$
$612: P_{22539} = (10, 31, 20, 1)$
$613: P_{22559} = (30, 31, 20, 1)$
$614: P_{22575} = (14, 0, 21, 1)$
$615: P_{22576} = (15, 0, 21, 1)$
$616: P_{22643} = (18, 2, 21, 1)$
$617: P_{22653} = (28, 2, 21, 1)$
$618: P_{22667} = (10, 3, 21, 1)$
$619: P_{22674} = (17, 3, 21, 1)$
$620: P_{22822} = (5, 8, 21, 1)$
$621: P_{22846} = (29, 8, 21, 1)$
$622: P_{22856} = (7, 9, 21, 1)$
$623: P_{22859} = (10, 9, 21, 1)$
$624: P_{22982} = (5, 13, 21, 1)$
$625: P_{22999} = (22, 13, 21, 1)$
$626: P_{23016} = (7, 14, 21, 1)$
$627: P_{23023} = (14, 14, 21, 1)$
$628: P_{23056} = (15, 15, 21, 1)$
$629: P_{23060} = (19, 15, 21, 1)$
$630: P_{23077} = (4, 16, 21, 1)$
$631: P_{23091} = (18, 16, 21, 1)$
$632: P_{23145} = (8, 18, 21, 1)$
$633: P_{23154} = (17, 18, 21, 1)$
$634: P_{23205} = (4, 20, 21, 1)$
$635: P_{23213} = (12, 20, 21, 1)$
$636: P_{23262} = (29, 21, 21, 1)$
$637: P_{23332} = (3, 24, 21, 1)$
$638: P_{23341} = (12, 24, 21, 1)$
$639: P_{23401} = (8, 26, 21, 1)$
$640: P_{23428} = (3, 27, 21, 1)$
$641: P_{23447} = (22, 27, 21, 1)$
$642: P_{23459} = (2, 28, 21, 1)$
$643: P_{23476} = (19, 28, 21, 1)$
$644: P_{23523} = (2, 30, 21, 1)$
$645: P_{23549} = (28, 30, 21, 1)$
$646: P_{23625} = (8, 1, 22, 1)$
$647: P_{23648} = (31, 1, 22, 1)$
$648: P_{23727} = (14, 4, 22, 1)$
$649: P_{23742} = (29, 4, 22, 1)$
$650: P_{23825} = (16, 7, 22, 1)$
$651: P_{23837} = (28, 7, 22, 1)$
$652: P_{23861} = (20, 8, 22, 1)$
$653: P_{23881} = (8, 9, 22, 1)$

$654: P_{23903} = (30, 9, 22, 1)$

$655: P_{23912} = (7, 10, 22, 1)$

$656: P_{23919} = (14, 10, 22, 1)$

$657: P_{24004} = (3, 13, 22, 1)$

$658: P_{24008} = (7, 13, 22, 1)$

$659: P_{24036} = (3, 14, 22, 1)$

$660: P_{24057} = (24, 14, 22, 1)$

$661: P_{24106} = (9, 16, 22, 1)$

$662: P_{24107} = (10, 16, 22, 1)$

$663: P_{24313} = (24, 22, 22, 1)$

$664: P_{24337} = (16, 23, 22, 1)$

$665: P_{24351} = (30, 23, 22, 1)$

$666: P_{24357} = (4, 24, 22, 1)$

$667: P_{24359} = (6, 24, 22, 1)$

$668: P_{24394} = (9, 25, 22, 1)$

$669: P_{24414} = (29, 25, 22, 1)$

$670: P_{24418} = (1, 26, 22, 1)$

$671: P_{24427} = (10, 26, 22, 1)$

$672: P_{24450} = (1, 27, 22, 1)$

$673: P_{24477} = (28, 27, 22, 1)$

$674: P_{24485} = (4, 28, 22, 1)$

$675: P_{24501} = (20, 28, 22, 1)$

$676: P_{24551} = (6, 30, 22, 1)$

$677: P_{24576} = (31, 30, 22, 1)$

$678: P_{24627} = (18, 0, 23, 1)$

$679: P_{24628} = (19, 0, 23, 1)$

$680: P_{24679} = (6, 2, 23, 1)$

$681: P_{24685} = (12, 2, 23, 1)$

$682: P_{24743} = (6, 4, 23, 1)$

$683: P_{24754} = (17, 4, 23, 1)$

$684: P_{24783} = (14, 5, 23, 1)$

$685: P_{24881} = (16, 8, 23, 1)$

$686: P_{24889} = (24, 8, 23, 1)$

$687: P_{24975} = (14, 11, 23, 1)$

$688: P_{24987} = (26, 11, 23, 1)$

$689: P_{25069} = (12, 14, 23, 1)$

$690: P_{25082} = (25, 14, 23, 1)$

$691: P_{25117} = (28, 15, 23, 1)$

$692: P_{25119} = (30, 15, 23, 1)$

$693: P_{25132} = (11, 16, 23, 1)$

$694: P_{25145} = (24, 16, 23, 1)$

$695: P_{25179} = (26, 17, 23, 1)$

$696: P_{25183} = (30, 17, 23, 1)$

$697: P_{25195} = (10, 18, 23, 1)$

$698: P_{25203} = (18, 18, 23, 1)$

$699: P_{25236} = (19, 19, 23, 1)$

$700: P_{25245} = (28, 19, 23, 1)$

$701: P_{25284} = (3, 21, 23, 1)$

$702: P_{25298} = (17, 21, 23, 1)$

$703: P_{25316} = (3, 22, 23, 1)$

$704: P_{25326} = (13, 22, 23, 1)$

$705: P_{25370} = (25, 23, 23, 1)$

$706: P_{25387} = (10, 24, 23, 1)$

$707: P_{25393} = (16, 24, 23, 1)$

$708: P_{25484} = (11, 27, 23, 1)$

$709: P_{25486} = (13, 27, 23, 1)$

$710: P_{25641} = (8, 0, 24, 1)$

$711: P_{25642} = (9, 0, 24, 1)$

$712: P_{25712} = (15, 2, 24, 1)$

$713: P_{25724} = (27, 2, 24, 1)$

$714: P_{25781} = (20, 4, 24, 1)$

$715: P_{25787} = (26, 4, 24, 1)$

$716: P_{25870} = (13, 7, 24, 1)$

$717: P_{25871} = (14, 7, 24, 1)$

$718: P_{25897} = (8, 8, 24, 1)$

$719: P_{25912} = (23, 8, 24, 1)$

$720: P_{25930} = (9, 9, 24, 1)$

$721: P_{25935} = (14, 9, 24, 1)$

$722: P_{25960} = (7, 10, 24, 1)$

$723: P_{25966} = (13, 10, 24, 1)$

$724: P_{26020} = (3, 12, 24, 1)$

$725: P_{26036} = (19, 12, 24, 1)$

$726: P_{26056} = (7, 13, 24, 1)$

$727: P_{26064} = (15, 13, 24, 1)$

$728: P_{26116} = (3, 15, 24, 1)$

$729: P_{26143} = (30, 15, 24, 1)$

$730: P_{26157} = (12, 16, 24, 1)$

$731: P_{26165} = (20, 16, 24, 1)$

$732: P_{26207} = (30, 17, 24, 1)$

$733: P_{26407} = (6, 24, 24, 1)$

$734: P_{26438} = (5, 25, 24, 1)$

$735: P_{26460} = (27, 25, 24, 1)$

$736: P_{26534} = (5, 28, 24, 1)$

$737: P_{26541} = (12, 28, 24, 1)$

$738: P_{26599} = (6, 30, 24, 1)$

$739: P_{26619} = (26, 30, 24, 1)$

$740: P_{26644} = (19, 31, 24, 1)$

$741: P_{26648} = (23, 31, 24, 1)$

$742: P_{26699} = (10, 1, 25, 1)$

$743: P_{26707} = (18, 1, 25, 1)$

$744: P_{26722} = (1, 2, 25, 1)$

$745: P_{26744} = (23, 2, 25, 1)$

$746: P_{26754} = (1, 3, 25, 1)$

$747: P_{26767} = (14, 3, 25, 1)$

$748: P_{26860} = (11, 6, 25, 1)$

$749: P_{26871} = (22, 6, 25, 1)$

$750: P_{26897} = (16, 7, 25, 1)$

$751: P_{26901} = (20, 7, 25, 1)$

$752: P_{27006} = (29, 10, 25, 1)$

$753: P_{27019} = (10, 11, 25, 1)$

$754: P_{27028} = (19, 11, 25, 1)$

$755: P_{27084} = (11, 13, 25, 1)$

$756: P_{27087} = (14, 13, 25, 1)$

$757: P_{27126} = (21, 14, 25, 1)$

$758: P_{27135} = (30, 14, 25, 1)$

$759: P_{27191} = (22, 16, 25, 1)$

$760: P_{27199} = (30, 16, 25, 1)$

$761: P_{27283} = (18, 19, 25, 1)$

$762: P_{27285} = (20, 19, 25, 1)$
$763: P_{27342} = (13, 21, 25, 1)$
$764: P_{27352} = (23, 21, 25, 1)$
$765: P_{27409} = (16, 23, 25, 1)$
$766: P_{27422} = (29, 23, 25, 1)$
$767: P_{27438} = (13, 24, 25, 1)$
$768: P_{27444} = (19, 24, 25, 1)$
$769: P_{27464} = (7, 25, 25, 1)$
$770: P_{27526} = (5, 27, 25, 1)$
$771: P_{27542} = (21, 27, 25, 1)$
$772: P_{27622} = (5, 30, 25, 1)$
$773: P_{27624} = (7, 30, 25, 1)$
$774: P_{27709} = (28, 0, 26, 1)$
$775: P_{27710} = (29, 0, 26, 1)$
$776: P_{27782} = (5, 3, 26, 1)$
$777: P_{27792} = (15, 3, 26, 1)$
$778: P_{27819} = (10, 4, 26, 1)$
$779: P_{27821} = (12, 4, 26, 1)$
$780: P_{27878} = (5, 6, 26, 1)$
$781: P_{27891} = (18, 6, 26, 1)$
$782: P_{27940} = (3, 8, 26, 1)$
$783: P_{27949} = (12, 8, 26, 1)$
$784: P_{27973} = (4, 9, 26, 1)$
$785: P_{27986} = (17, 9, 26, 1)$
$786: P_{28036} = (3, 11, 26, 1)$
$787: P_{28040} = (7, 11, 26, 1)$
$788: P_{28072} = (7, 12, 26, 1)$
$789: P_{28080} = (15, 12, 26, 1)$
$790: P_{28101} = (4, 13, 26, 1)$
$791: P_{28119} = (22, 13, 26, 1)$
$792: P_{28139} = (10, 14, 26, 1)$
$793: P_{28148} = (19, 14, 26, 1)$
$794: P_{28329} = (8, 20, 26, 1)$
$795: P_{28339} = (18, 20, 26, 1)$
$796: P_{28367} = (14, 21, 26, 1)$
$797: P_{28451} = (2, 24, 26, 1)$
$798: P_{28466} = (17, 24, 26, 1)$
$799: P_{28515} = (2, 26, 26, 1)$
$800: P_{28559} = (14, 27, 26, 1)$
$801: P_{28567} = (22, 27, 26, 1)$
$802: P_{28585} = (8, 28, 26, 1)$
$803: P_{28605} = (28, 28, 26, 1)$
$804: P_{28628} = (19, 29, 26, 1)$
$805: P_{28638} = (29, 29, 26, 1)$
$806: P_{28750} = (13, 1, 27, 1)$
$807: P_{28760} = (23, 1, 27, 1)$
$808: P_{28874} = (9, 5, 27, 1)$
$809: P_{28881} = (16, 5, 27, 1)$
$810: P_{28948} = (19, 7, 27, 1)$
$811: P_{28954} = (25, 7, 27, 1)$
$812: P_{28962} = (1, 8, 27, 1)$
$813: P_{28967} = (6, 8, 27, 1)$
$814: P_{28994} = (1, 9, 27, 1)$
$815: P_{29022} = (29, 9, 27, 1)$

$816: P_{29098} = (9, 12, 27, 1)$
$817: P_{29102} = (13, 12, 27, 1)$
$818: P_{29159} = (6, 14, 27, 1)$
$819: P_{29170} = (17, 14, 27, 1)$
$820: P_{29222} = (5, 16, 27, 1)$
$821: P_{29225} = (8, 16, 27, 1)$
$822: P_{29364} = (19, 20, 27, 1)$
$823: P_{29374} = (29, 20, 27, 1)$
$824: P_{29382} = (5, 21, 27, 1)$
$825: P_{29393} = (16, 21, 27, 1)$
$826: P_{29419} = (10, 22, 27, 1)$
$827: P_{29432} = (23, 22, 27, 1)$
$828: P_{29476} = (3, 24, 27, 1)$
$829: P_{29481} = (8, 24, 27, 1)$
$830: P_{29572} = (3, 27, 27, 1)$
$831: P_{29603} = (2, 28, 27, 1)$
$832: P_{29611} = (10, 28, 27, 1)$
$833: P_{29667} = (2, 30, 27, 1)$
$834: P_{29690} = (25, 30, 27, 1)$
$835: P_{29714} = (17, 31, 27, 1)$
$836: P_{29759} = (30, 0, 28, 1)$
$837: P_{29760} = (31, 0, 28, 1)$
$838: P_{29798} = (5, 2, 28, 1)$
$839: P_{29818} = (25, 2, 28, 1)$
$840: P_{29835} = (10, 3, 28, 1)$
$841: P_{29866} = (9, 4, 28, 1)$
$842: P_{29880} = (23, 4, 28, 1)$
$843: P_{29901} = (12, 5, 28, 1)$
$844: P_{29903} = (14, 5, 28, 1)$
$845: P_{29958} = (5, 7, 28, 1)$
$846: P_{29979} = (26, 7, 28, 1)$
$847: P_{30027} = (10, 9, 28, 1)$
$848: P_{30029} = (12, 9, 28, 1)$
$849: P_{30066} = (17, 10, 28, 1)$
$850: P_{30071} = (22, 10, 28, 1)$
$851: P_{30095} = (14, 11, 28, 1)$
$852: P_{30102} = (21, 11, 28, 1)$
$853: P_{30154} = (9, 13, 28, 1)$
$854: P_{30161} = (16, 13, 28, 1)$
$855: P_{30341} = (4, 19, 28, 1)$
$856: P_{30360} = (23, 19, 28, 1)$
$857: P_{30469} = (4, 23, 28, 1)$
$858: P_{30473} = (8, 23, 28, 1)$
$859: P_{30610} = (17, 27, 28, 1)$
$860: P_{30618} = (25, 27, 28, 1)$
$861: P_{30647} = (22, 28, 28, 1)$
$862: P_{30673} = (16, 29, 28, 1)$
$863: P_{30683} = (26, 29, 28, 1)$
$864: P_{30710} = (21, 30, 28, 1)$
$865: P_{30719} = (30, 30, 28, 1)$
$866: P_{30729} = (8, 31, 28, 1)$
$867: P_{30752} = (31, 31, 28, 1)$
$868: P_{30800} = (15, 1, 29, 1)$
$869: P_{30804} = (19, 1, 29, 1)$

$870: P_{30827} = (10, 2, 29, 1)$
$871: P_{30837} = (20, 2, 29, 1)$
$872: P_{30889} = (8, 4, 29, 1)$
$873: P_{30899} = (18, 4, 29, 1)$
$874: P_{31019} = (10, 8, 29, 1)$
$875: P_{31033} = (24, 8, 29, 1)$
$876: P_{31096} = (23, 10, 29, 1)$
$877: P_{31099} = (26, 10, 29, 1)$
$878: P_{31138} = (1, 12, 29, 1)$
$879: P_{31145} = (8, 12, 29, 1)$
$880: P_{31170} = (1, 13, 29, 1)$
$881: P_{31190} = (21, 13, 29, 1)$
$882: P_{31216} = (15, 14, 29, 1)$
$883: P_{31226} = (25, 14, 29, 1)$
$884: P_{31289} = (24, 16, 29, 1)$
$885: P_{31291} = (26, 16, 29, 1)$
$886: P_{31343} = (14, 18, 29, 1)$
$887: P_{31348} = (19, 18, 29, 1)$
$888: P_{31367} = (6, 19, 29, 1)$
$889: P_{31427} = (2, 21, 29, 1)$
$890: P_{31431} = (6, 21, 29, 1)$
$891: P_{31475} = (18, 22, 29, 1)$
$892: P_{31477} = (20, 22, 29, 1)$
$893: P_{31491} = (2, 23, 29, 1)$
$894: P_{31514} = (25, 23, 29, 1)$
$895: P_{31525} = (4, 24, 29, 1)$
$896: P_{31542} = (21, 24, 29, 1)$
$897: P_{31653} = (4, 28, 29, 1)$
$898: P_{31663} = (14, 28, 29, 1)$
$899: P_{31704} = (23, 29, 29, 1)$
$900: P_{31846} = (5, 2, 30, 1)$
$901: P_{31870} = (29, 2, 30, 1)$
$902: P_{31882} = (9, 3, 30, 1)$
$903: P_{31888} = (15, 3, 30, 1)$
$904: P_{31953} = (16, 5, 30, 1)$
$905: P_{31961} = (24, 5, 30, 1)$
$906: P_{32006} = (5, 7, 30, 1)$
$907: P_{32021} = (20, 7, 30, 1)$
$908: P_{32106} = (9, 10, 30, 1)$
$909: P_{32123} = (26, 10, 30, 1)$
$910: P_{32176} = (15, 12, 30, 1)$
$911: P_{32179} = (18, 12, 30, 1)$
$912: P_{32242} = (17, 14, 30, 1)$
$913: P_{32246} = (21, 14, 30, 1)$
$914: P_{32302} = (13, 16, 30, 1)$
$915: P_{32315} = (26, 16, 30, 1)$

$916: P_{32389} = (4, 19, 30, 1)$
$917: P_{32405} = (20, 19, 30, 1)$
$918: P_{32420} = (3, 20, 30, 1)$
$919: P_{32463} = (14, 21, 30, 1)$
$920: P_{32465} = (16, 21, 30, 1)$
$921: P_{32516} = (3, 23, 30, 1)$
$922: P_{32517} = (4, 23, 30, 1)$
$923: P_{32655} = (14, 27, 30, 1)$
$924: P_{32662} = (21, 27, 30, 1)$
$925: P_{32718} = (13, 29, 30, 1)$
$926: P_{32729} = (24, 29, 30, 1)$
$927: P_{32755} = (18, 30, 30, 1)$
$928: P_{32786} = (17, 31, 30, 1)$
$929: P_{32798} = (29, 31, 30, 1)$
$930: P_{32817} = (16, 0, 31, 1)$
$931: P_{32818} = (17, 0, 31, 1)$
$932: P_{32836} = (3, 1, 31, 1)$
$933: P_{32862} = (29, 1, 31, 1)$
$934: P_{32868} = (3, 2, 31, 1)$
$935: P_{32890} = (25, 2, 31, 1)$
$936: P_{32994} = (1, 6, 31, 1)$
$937: P_{33001} = (8, 6, 31, 1)$
$938: P_{33026} = (1, 7, 31, 1)$
$939: P_{33048} = (23, 7, 31, 1)$
$940: P_{33187} = (2, 12, 31, 1)$
$941: P_{33204} = (19, 12, 31, 1)$
$942: P_{33251} = (2, 14, 31, 1)$
$943: P_{33257} = (8, 14, 31, 1)$
$944: P_{33329} = (16, 16, 31, 1)$
$945: P_{33336} = (23, 16, 31, 1)$
$946: P_{33354} = (9, 17, 31, 1)$
$947: P_{33362} = (17, 17, 31, 1)$
$948: P_{33414} = (5, 19, 31, 1)$
$949: P_{33415} = (6, 19, 31, 1)$
$950: P_{33479} = (6, 21, 31, 1)$
$951: P_{33486} = (13, 21, 31, 1)$
$952: P_{33510} = (5, 22, 31, 1)$
$953: P_{33515} = (10, 22, 31, 1)$
$954: P_{33578} = (9, 24, 31, 1)$
$955: P_{33582} = (13, 24, 31, 1)$
$956: P_{33690} = (25, 27, 31, 1)$
$957: P_{33707} = (10, 28, 31, 1)$
$958: P_{33726} = (29, 28, 31, 1)$
$959: P_{33812} = (19, 31, 31, 1)$

Line Intersection Graph

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

Neighbor sets in the line intersection graph:
Line 0 intersects

Line	ℓ_1	ℓ_2
in point	P_1	P_1

Line 1 intersects

Line	ℓ_0	ℓ_2	ℓ_3
in point	P_1	P_1	P_3

Line 2 intersects

Line	ℓ_0	ℓ_1
in point	P_1	P_1

Line 3 intersects

Line	ℓ_1
in point	P_3

The surface has 1089 points:
Too many to print.