Rank-76308 over GF(32)

January 15, 2021

The equation

The equation of the surface is :

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

(1, 0, 0, 0, 1, 0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 0, 0)
The point rank of the equation over GF(32) is 1109427238

General information

Number of lines	4
Number of points	1121
Number of singular points	0
Number of Eckardt points	1
Number of double points	1
Number of single points	127
Number of points off lines	992
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^{992}

Singular Points

The surface has 0 singular points:

The 4 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{1083424} = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_{1083424} = \mathbf{Pl}(0,1,0,0,0,0)_1$$

$$\ell_1 = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{34848} = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{34848} = \mathbf{Pl}(0,1,1,0,0,0)_{34}$$

$$\ell_2 = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{2082} = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{2082} = \mathbf{Pl}(0,0,1,1,1,1)_{70562}$$

$$\ell_3 = \begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{35906} = \begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}_{35906} = \mathbf{Pl}(0,1,1,1,1,1)_{70594}$$

Rank of lines: (1083424, 34848, 2082, 35906)
Rank of points on Klein quadric: (1, 34, 70562, 70594)

Eckardt Points

The surface has 1 Eckardt points:
$0 : P_{2082} = \mathbf{P}(0,0,1,1) = \mathbf{P}(0,0,1,1)$.

Double Points

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

$P_2 = (0,0,1,0) = \ell_0 \cap \ell_1$

Single Points

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

$0 : P_3 = (0,0,0,1)$ lies on line ℓ_0

$1 : P_4 = (1,1,1,1)$ lies on line ℓ_2

$2 : P_5 = (1,1,0,0)$ lies on line ℓ_2

$3 : P_{68} = (1,1,1,0)$ lies on line ℓ_3

$4 : P_{1059} = (1,0,0,1)$ lies on line ℓ_1

$5 : P_{1091} = (1,1,0,1)$ lies on line ℓ_3

$6 : P_{2083} = (1,0,1,1)$ lies on line ℓ_1

$7 : P_{2147} = (2,2,1,1)$ lies on line ℓ_2

$8 : P_{2180} = (3,3,1,1)$ lies on line ℓ_2

$9 : P_{2213} = (4,4,1,1)$ lies on line ℓ_2

$10 : P_{2246} = (5,5,1,1)$ lies on line ℓ_2

$11 : P_{2279} = (6,6,1,1)$ lies on line ℓ_2

$12 : P_{2312} = (7,7,1,1)$ lies on line ℓ_2

$13 : P_{2345} = (8,8,1,1)$ lies on line ℓ_2

$14 : P_{2378} = (9,9,1,1)$ lies on line ℓ_2

$15 : P_{2411} = (10,10,1,1)$ lies on line ℓ_2

$16 : P_{2444} = (11,11,1,1)$ lies on line ℓ_2

$17 : P_{2477} = (12,12,1,1)$ lies on line ℓ_2

$18 : P_{2510} = (13,13,1,1)$ lies on line ℓ_2

$19 : P_{2543} = (14,14,1,1)$ lies on line ℓ_2

$20 : P_{2576} = (15,15,1,1)$ lies on line ℓ_2

$21 : P_{2609} = (16,16,1,1)$ lies on line ℓ_2

$22 : P_{2642} = (17,17,1,1)$ lies on line ℓ_2

$23 : P_{2675} = (18,18,1,1)$ lies on line ℓ_2

$24 : P_{2708} = (19,19,1,1)$ lies on line ℓ_2

$25 : P_{2741} = (20,20,1,1)$ lies on line ℓ_2

$26 : P_{2774} = (21,21,1,1)$ lies on line ℓ_2

$27 : P_{2807} = (22,22,1,1)$ lies on line ℓ_2

$28 : P_{2840} = (23,23,1,1)$ lies on line ℓ_2

$29 : P_{2873} = (24,24,1,1)$ lies on line ℓ_2

$30 : P_{2906} = (25,25,1,1)$ lies on line ℓ_2

$31 : P_{2939} = (26,26,1,1)$ lies on line ℓ_2

$32 : P_{2972} = (27,27,1,1)$ lies on line ℓ_2

$33 : P_{3005} = (28,28,1,1)$ lies on line ℓ_2

$34 : P_{3038} = (29,29,1,1)$ lies on line ℓ_2

$35 : P_{3071} = (30,30,1,1)$ lies on line ℓ_2

$36 : P_{3104} = (31,31,1,1)$ lies on line ℓ_2

$37 : P_{3105} = (0,0,2,1)$ lies on line ℓ_0

$38 : P_{3106} = (1,0,2,1)$ lies on line ℓ_1

$39 : P_{3204} = (3,3,2,1)$ lies on line ℓ_3

$40 : P_{4129} = (0,0,3,1)$ lies on line ℓ_0

$41 : P_{4130} = (1,0,3,1)$ lies on line ℓ_1

$42 : P_{4195} = (2,2,3,1)$ lies on line ℓ_3

$43 : P_{5153} = (0,0,4,1)$ lies on line ℓ_0

$44 : P_{5154} = (1,0,4,1)$ lies on line ℓ_1

$45 : P_{5318} = (5,5,4,1)$ lies on line ℓ_3

$46 : P_{6177} = (0,0,5,1)$ lies on line ℓ_0

$47 : P_{6178} = (1,0,5,1)$ lies on line ℓ_1

$48 : P_{6309} = (4,4,5,1)$ lies on line ℓ_3

$49 : P_{7201} = (0,0,6,1)$ lies on line ℓ_0

$50 : P_{7202} = (1,0,6,1)$ lies on line ℓ_1

$51 : P_{7432} = (7,7,6,1)$ lies on line ℓ_3

$52 : P_{8225} = (0, 0, 7, 1)$ lies on line ℓ_0

$53 : P_{8226} = (1, 0, 7, 1)$ lies on line ℓ_1

$54 : P_{8423} = (6, 6, 7, 1)$ lies on line ℓ_3

$55 : P_{9249} = (0, 0, 8, 1)$ lies on line ℓ_0

$56 : P_{9250} = (1, 0, 8, 1)$ lies on line ℓ_1

$57 : P_{9546} = (9, 9, 8, 1)$ lies on line ℓ_3

$58 : P_{10273} = (0, 0, 9, 1)$ lies on line ℓ_0

$59 : P_{10274} = (1, 0, 9, 1)$ lies on line ℓ_1

$60 : P_{10537} = (8, 8, 9, 1)$ lies on line ℓ_3

$61 : P_{11297} = (0, 0, 10, 1)$ lies on line ℓ_0

$62 : P_{11298} = (1, 0, 10, 1)$ lies on line ℓ_1

$63 : P_{11660} = (11, 11, 10, 1)$ lies on line ℓ_3

$64 : P_{12321} = (0, 0, 11, 1)$ lies on line ℓ_0

$65 : P_{12322} = (1, 0, 11, 1)$ lies on line ℓ_1

$66 : P_{12651} = (10, 10, 11, 1)$ lies on line ℓ_3

$67 : P_{13345} = (0, 0, 12, 1)$ lies on line ℓ_0

$68 : P_{13346} = (1, 0, 12, 1)$ lies on line ℓ_1

$69 : P_{13774} = (13, 13, 12, 1)$ lies on line ℓ_3

$70 : P_{14369} = (0, 0, 13, 1)$ lies on line ℓ_0

$71 : P_{14370} = (1, 0, 13, 1)$ lies on line ℓ_1

$72 : P_{14765} = (12, 12, 13, 1)$ lies on line ℓ_3

$73 : P_{15393} = (0, 0, 14, 1)$ lies on line ℓ_0

$74 : P_{15394} = (1, 0, 14, 1)$ lies on line ℓ_1

$75 : P_{15888} = (15, 15, 14, 1)$ lies on line ℓ_3

$76 : P_{16417} = (0, 0, 15, 1)$ lies on line ℓ_0

$77 : P_{16418} = (1, 0, 15, 1)$ lies on line ℓ_1

$78 : P_{16879} = (14, 14, 15, 1)$ lies on line ℓ_3

$79 : P_{17441} = (0, 0, 16, 1)$ lies on line ℓ_0

$80 : P_{17442} = (1, 0, 16, 1)$ lies on line ℓ_1

$81 : P_{18002} = (17, 17, 16, 1)$ lies on line ℓ_3

$82 : P_{18465} = (0, 0, 17, 1)$ lies on line ℓ_0

$83 : P_{18466} = (1, 0, 17, 1)$ lies on line ℓ_1

$84 : P_{18993} = (16, 16, 17, 1)$ lies on line ℓ_3

$85 : P_{19489} = (0, 0, 18, 1)$ lies on line ℓ_0

$86 : P_{19490} = (1, 0, 18, 1)$ lies on line ℓ_1

$87 : P_{20116} = (19, 19, 18, 1)$ lies on line ℓ_3

$88 : P_{20513} = (0, 0, 19, 1)$ lies on line ℓ_0

$89 : P_{20514} = (1, 0, 19, 1)$ lies on line ℓ_1

$90 : P_{21107} = (18, 18, 19, 1)$ lies on line ℓ_3

$91 : P_{21537} = (0, 0, 20, 1)$ lies on line ℓ_0

$92 : P_{21538} = (1, 0, 20, 1)$ lies on line ℓ_1

$93 : P_{22230} = (21, 21, 20, 1)$ lies on line ℓ_3

$94 : P_{22561} = (0, 0, 21, 1)$ lies on line ℓ_0

$95 : P_{22562} = (1, 0, 21, 1)$ lies on line ℓ_1

$96 : P_{23221} = (20, 20, 21, 1)$ lies on line ℓ_3

$97 : P_{23585} = (0, 0, 22, 1)$ lies on line ℓ_0

$98 : P_{23586} = (1, 0, 22, 1)$ lies on line ℓ_1

$99 : P_{24344} = (23, 23, 22, 1)$ lies on line ℓ_3

$100 : P_{24609} = (0, 0, 23, 1)$ lies on line ℓ_0

$101 : P_{24610} = (1, 0, 23, 1)$ lies on line ℓ_1

$102 : P_{25335} = (22, 22, 23, 1)$ lies on line ℓ_3

$103 : P_{25633} = (0, 0, 24, 1)$ lies on line ℓ_0

$104 : P_{25634} = (1, 0, 24, 1)$ lies on line ℓ_1

$105 : P_{26458} = (25, 25, 24, 1)$ lies on line ℓ_3

$106 : P_{26657} = (0, 0, 25, 1)$ lies on line ℓ_0

$107 : P_{26658} = (1, 0, 25, 1)$ lies on line ℓ_1

$108 : P_{27449} = (24, 24, 25, 1)$ lies on line ℓ_3

$109 : P_{27681} = (0, 0, 26, 1)$ lies on line ℓ_0

$110 : P_{27682} = (1, 0, 26, 1)$ lies on line ℓ_1

$111 : P_{28572} = (27, 27, 26, 1)$ lies on line ℓ_3

$112 : P_{28705} = (0, 0, 27, 1)$ lies on line ℓ_0

$113 : P_{28706} = (1, 0, 27, 1)$ lies on line ℓ_1

$114 : P_{29563} = (26, 26, 27, 1)$ lies on line ℓ_3

$115 : P_{29729} = (0, 0, 28, 1)$ lies on line ℓ_0

$116 : P_{29730} = (1, 0, 28, 1)$ lies on line ℓ_1

$117 : P_{30686} = (29, 29, 28, 1)$ lies on line ℓ_3

$118 : P_{30753} = (0, 0, 29, 1)$ lies on line ℓ_0

$119 : P_{30754} = (1, 0, 29, 1)$ lies on line ℓ_1

$120 : P_{31677} = (28, 28, 29, 1)$ lies on line ℓ_3

$121 : P_{31777} = (0, 0, 30, 1)$ lies on line ℓ_0

$122 : P_{31778} = (1, 0, 30, 1)$ lies on line ℓ_1

$123 : P_{32800} = (31, 31, 30, 1)$ lies on line ℓ_3

$124 : P_{32801} = (0, 0, 31, 1)$ lies on line ℓ_0

$125 : P_{32802} = (1, 0, 31, 1)$ lies on line ℓ_1

$126 : P_{33791} = (30, 30, 31, 1)$ lies on line ℓ_3

The single points on the surface are:

Points on surface but on no line

The surface has 992 points not on any line:
The points on the surface but not on lines are:

$0 : P_1 = (0, 1, 0, 0)$

$1 : P_{120} = (21, 2, 1, 0)$

$2 : P_{151} = (20, 3, 1, 0)$

$3 : P_{191} = (28, 4, 1, 0)$

$4 : P_{224} = (29, 5, 1, 0)$

$5 : P_{245} = (18, 6, 1, 0)$

$6 : P_{278} = (19, 7, 1, 0)$

$7 : P_{303} = (12, 8, 1, 0)$

$8 : P_{336} = (13, 9, 1, 0)$

$9 : P_{381} = (26, 10, 1, 0)$

$10 : P_{414} = (27, 11, 1, 0)$

$11 : P_{444} = (25, 12, 1, 0)$

$12 : P_{475} = (24, 13, 1, 0)$
$13 : P_{486} = (3, 14, 1, 0)$
$14 : P_{517} = (2, 15, 1, 0)$
$15 : P_{570} = (23, 16, 1, 0)$
$16 : P_{601} = (22, 17, 1, 0)$
$17 : P_{627} = (16, 18, 1, 0)$
$18 : P_{660} = (17, 19, 1, 0)$
$19 : P_{684} = (9, 20, 1, 0)$
$20 : P_{715} = (8, 21, 1, 0)$
$21 : P_{754} = (15, 22, 1, 0)$
$22 : P_{785} = (14, 23, 1, 0)$
$23 : P_{833} = (30, 24, 1, 0)$
$24 : P_{866} = (31, 25, 1, 0)$
$25 : P_{873} = (6, 26, 1, 0)$
$26 : P_{906} = (7, 27, 1, 0)$
$27 : P_{941} = (10, 28, 1, 0)$
$28 : P_{974} = (11, 29, 1, 0)$
$29 : P_{1000} = (5, 30, 1, 0)$
$30 : P_{1031} = (4, 31, 1, 0)$
$31 : P_{1138} = (16, 2, 0, 1)$
$32 : P_{1183} = (29, 3, 0, 1)$
$33 : P_{1199} = (13, 4, 0, 1)$
$34 : P_{1240} = (22, 5, 0, 1)$
$35 : P_{1302} = (20, 7, 0, 1)$
$36 : P_{1348} = (2, 9, 0, 1)$
$37 : P_{1414} = (4, 11, 0, 1)$
$38 : P_{1448} = (6, 12, 0, 1)$
$39 : P_{1476} = (2, 13, 0, 1)$
$40 : P_{1554} = (16, 15, 0, 1)$
$41 : P_{1597} = (27, 16, 0, 1)$
$42 : P_{1627} = (25, 17, 0, 1)$
$43 : P_{1661} = (27, 18, 0, 1)$
$44 : P_{1759} = (29, 21, 0, 1)$
$45 : P_{1819} = (25, 23, 0, 1)$
$46 : P_{1832} = (6, 24, 0, 1)$
$47 : P_{1910} = (20, 26, 0, 1)$
$48 : P_{1926} = (4, 27, 0, 1)$
$49 : P_{1976} = (22, 28, 0, 1)$
$50 : P_{2063} = (13, 31, 0, 1)$
$51 : P_{2114} = (0, 1, 1, 1)$
$52 : P_{2171} = (26, 2, 1, 1)$
$53 : P_{2204} = (27, 3, 1, 1)$
$54 : P_{2212} = (3, 4, 1, 1)$
$55 : P_{2243} = (2, 5, 1, 1)$
$56 : P_{2297} = (24, 6, 1, 1)$
$57 : P_{2330} = (25, 7, 1, 1)$
$58 : P_{2355} = (18, 8, 1, 1)$
$59 : P_{2388} = (19, 9, 1, 1)$
$60 : P_{2410} = (9, 10, 1, 1)$
$61 : P_{2441} = (8, 11, 1, 1)$
$62 : P_{2481} = (16, 12, 1, 1)$
$63 : P_{2514} = (17, 13, 1, 1)$
$64 : P_{2540} = (11, 14, 1, 1)$
$65 : P_{2571} = (10, 15, 1, 1)$

$66 : P_{2598} = (5, 16, 1, 1)$
$67 : P_{2629} = (4, 17, 1, 1)$
$68 : P_{2687} = (30, 18, 1, 1)$
$69 : P_{2720} = (31, 19, 1, 1)$
$70 : P_{2728} = (7, 20, 1, 1)$
$71 : P_{2759} = (6, 21, 1, 1)$
$72 : P_{2813} = (28, 22, 1, 1)$
$73 : P_{2846} = (29, 23, 1, 1)$
$74 : P_{2871} = (22, 24, 1, 1)$
$75 : P_{2904} = (23, 25, 1, 1)$
$76 : P_{2926} = (13, 26, 1, 1)$
$77 : P_{2957} = (12, 27, 1, 1)$
$78 : P_{2997} = (20, 28, 1, 1)$
$79 : P_{3030} = (21, 29, 1, 1)$
$80 : P_{3056} = (15, 30, 1, 1)$
$81 : P_{3087} = (14, 31, 1, 1)$
$82 : P_{3167} = (30, 1, 2, 1)$
$83 : P_{3225} = (24, 3, 2, 1)$
$84 : P_{3233} = (0, 4, 2, 1)$
$85 : P_{3236} = (3, 4, 2, 1)$
$86 : P_{3240} = (7, 4, 2, 1)$
$87 : P_{3306} = (9, 6, 2, 1)$
$88 : P_{3319} = (22, 6, 2, 1)$
$89 : P_{3322} = (25, 6, 2, 1)$
$90 : P_{3330} = (1, 7, 2, 1)$
$91 : P_{3367} = (6, 8, 2, 1)$
$92 : P_{3395} = (2, 9, 2, 1)$
$93 : P_{3448} = (23, 10, 2, 1)$
$94 : P_{3483} = (26, 11, 2, 1)$
$95 : P_{3510} = (21, 12, 2, 1)$
$96 : P_{3523} = (2, 13, 2, 1)$
$97 : P_{3615} = (30, 15, 2, 1)$
$98 : P_{3661} = (12, 17, 2, 1)$
$99 : P_{3662} = (13, 17, 2, 1)$
$100 : P_{3665} = (16, 17, 2, 1)$
$101 : P_{3703} = (22, 18, 2, 1)$
$102 : P_{3738} = (25, 19, 2, 1)$
$103 : P_{3751} = (6, 20, 2, 1)$
$104 : P_{3758} = (13, 20, 2, 1)$
$105 : P_{3776} = (31, 20, 2, 1)$
$106 : P_{3801} = (24, 21, 2, 1)$
$107 : P_{3853} = (12, 23, 2, 1)$
$108 : P_{3936} = (31, 25, 2, 1)$
$109 : P_{3976} = (7, 27, 2, 1)$
$110 : P_{3978} = (9, 27, 2, 1)$
$111 : P_{3990} = (21, 27, 2, 1)$
$112 : P_{4049} = (16, 29, 2, 1)$
$113 : P_{4056} = (23, 29, 2, 1)$
$114 : P_{4059} = (26, 29, 2, 1)$
$115 : P_{4166} = (5, 1, 3, 1)$
$116 : P_{4217} = (24, 2, 3, 1)$
$117 : P_{4274} = (17, 4, 3, 1)$
$118 : P_{4289} = (0, 5, 3, 1)$
$119 : P_{4291} = (2, 5, 3, 1)$

$120: P_{4296} = (7, 5, 3, 1)$

$121: P_{4349} = (28, 6, 3, 1)$

$122: P_{4354} = (1, 7, 3, 1)$

$123: P_{4497} = (16, 11, 3, 1)$

$124: P_{4555} = (10, 13, 3, 1)$

$125: P_{4569} = (24, 13, 3, 1)$

$126: P_{4576} = (31, 13, 3, 1)$

$127: P_{4700} = (27, 17, 3, 1)$

$128: P_{4763} = (26, 19, 3, 1)$

$129: P_{4829} = (28, 21, 3, 1)$

$130: P_{4849} = (16, 22, 3, 1)$

$131: P_{4907} = (10, 24, 3, 1)$

$132: P_{4966} = (5, 26, 3, 1)$

$133: P_{5010} = (17, 27, 3, 1)$

$134: P_{5032} = (7, 28, 3, 1)$

$135: P_{5115} = (26, 30, 3, 1)$

$136: P_{5116} = (27, 30, 3, 1)$

$137: P_{5120} = (31, 30, 3, 1)$

$138: P_{5204} = (19, 1, 4, 1)$

$139: P_{5228} = (11, 2, 4, 1)$

$140: P_{5238} = (21, 2, 4, 1)$

$141: P_{5245} = (28, 2, 4, 1)$

$142: P_{5320} = (7, 5, 4, 1)$

$143: P_{5363} = (18, 6, 4, 1)$

$144: P_{5415} = (6, 8, 4, 1)$

$145: P_{5466} = (25, 9, 4, 1)$

$146: P_{5493} = (20, 10, 4, 1)$

$147: P_{5509} = (4, 11, 4, 1)$

$148: P_{5550} = (13, 12, 4, 1)$

$149: P_{5563} = (26, 12, 4, 1)$

$150: P_{5564} = (27, 12, 4, 1)$

$151: P_{5625} = (24, 14, 4, 1)$

$152: P_{5636} = (3, 15, 4, 1)$

$153: P_{5665} = (0, 16, 4, 1)$

$154: P_{5670} = (5, 16, 4, 1)$

$155: P_{5686} = (21, 16, 4, 1)$

$156: P_{5799} = (6, 20, 4, 1)$

$157: P_{5804} = (11, 20, 4, 1)$

$158: P_{5818} = (25, 20, 4, 1)$

$159: P_{5826} = (1, 21, 4, 1)$

$160: P_{5860} = (3, 22, 4, 1)$

$161: P_{5870} = (13, 22, 4, 1)$

$162: P_{5881} = (24, 22, 4, 1)$

$163: P_{5947} = (26, 24, 4, 1)$

$164: P_{6013} = (28, 26, 4, 1)$

$165: P_{6021} = (4, 27, 4, 1)$

$166: P_{6056} = (7, 28, 4, 1)$

$167: P_{6099} = (18, 29, 4, 1)$

$168: P_{6101} = (20, 29, 4, 1)$

$169: P_{6108} = (27, 29, 4, 1)$

$170: P_{6164} = (19, 31, 4, 1)$

$171: P_{6226} = (17, 1, 5, 1)$

$172: P_{6253} = (12, 2, 5, 1)$

$173: P_{6290} = (17, 3, 5, 1)$

$174: P_{6312} = (7, 4, 5, 1)$

$175: P_{6415} = (14, 7, 5, 1)$

$176: P_{6436} = (3, 8, 5, 1)$

$177: P_{6563} = (2, 12, 5, 1)$

$178: P_{6670} = (13, 15, 5, 1)$

$179: P_{6701} = (12, 16, 5, 1)$

$180: P_{6721} = (0, 17, 5, 1)$

$181: P_{6725} = (4, 17, 5, 1)$

$182: P_{6742} = (21, 17, 5, 1)$

$183: P_{6787} = (2, 19, 5, 1)$

$184: P_{6788} = (3, 19, 5, 1)$

$185: P_{6803} = (18, 19, 5, 1)$

$186: P_{6840} = (23, 20, 5, 1)$

$187: P_{6850} = (1, 21, 5, 1)$

$188: P_{6934} = (21, 23, 5, 1)$

$189: P_{6990} = (13, 25, 5, 1)$

$190: P_{7048} = (7, 27, 5, 1)$

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$197: P_{7292} = (27, 2, 6, 1)$

$198: P_{7356} = (27, 4, 6, 1)$

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$224: P_{8081} = (16, 27, 6, 1)$

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$598: P_{21233} = (16, 22, 19, 1)$
$599: P_{21292} = (11, 24, 19, 1)$
$600: P_{21323} = (10, 25, 19, 1)$
$601: P_{21346} = (1, 26, 19, 1)$
$602: P_{21348} = (3, 26, 19, 1)$
$603: P_{21369} = (24, 26, 19, 1)$
$604: P_{21397} = (20, 27, 19, 1)$
$605: P_{21501} = (28, 30, 19, 1)$

$606: P_{21586} = (17, 1, 20, 1)$
$607: P_{21614} = (13, 2, 20, 1)$
$608: P_{21650} = (17, 3, 20, 1)$
$609: P_{21667} = (2, 4, 20, 1)$
$610: P_{21675} = (10, 4, 20, 1)$
$611: P_{21677} = (12, 4, 20, 1)$
$612: P_{21744} = (15, 6, 20, 1)$
$613: P_{21751} = (22, 6, 20, 1)$
$614: P_{21760} = (31, 6, 20, 1)$
$615: P_{21781} = (20, 7, 20, 1)$
$616: P_{21794} = (1, 8, 20, 1)$
$617: P_{21798} = (5, 8, 20, 1)$
$618: P_{21805} = (12, 8, 20, 1)$
$619: P_{21862} = (5, 10, 20, 1)$
$620: P_{21899} = (10, 11, 20, 1)$
$621: P_{21930} = (9, 12, 20, 1)$
$622: P_{22035} = (18, 15, 20, 1)$
$623: P_{22051} = (2, 16, 20, 1)$
$624: P_{22099} = (18, 17, 20, 1)$
$625: P_{22135} = (22, 18, 20, 1)$
$626: P_{22207} = (30, 20, 20, 1)$
$627: P_{22228} = (19, 21, 20, 1)$
$628: P_{22256} = (15, 22, 20, 1)$
$629: P_{22389} = (20, 26, 20, 1)$
$630: P_{22409} = (8, 27, 20, 1)$
$631: P_{22414} = (13, 27, 20, 1)$
$632: P_{22431} = (30, 27, 20, 1)$
$633: P_{22464} = (31, 28, 20, 1)$
$634: P_{22465} = (0, 29, 20, 1)$
$635: P_{22473} = (8, 29, 20, 1)$
$636: P_{22486} = (21, 29, 20, 1)$
$637: P_{22516} = (19, 30, 20, 1)$
$638: P_{22538} = (9, 31, 20, 1)$
$639: P_{22607} = (14, 1, 21, 1)$
$640: P_{22654} = (29, 2, 21, 1)$
$641: P_{22667} = (10, 3, 21, 1)$
$642: P_{22745} = (24, 5, 21, 1)$
$643: P_{22795} = (10, 7, 21, 1)$
$644: P_{22818} = (1, 8, 21, 1)$
$645: P_{22821} = (4, 8, 21, 1)$
$646: P_{22830} = (13, 8, 21, 1)$
$647: P_{22879} = (30, 9, 21, 1)$
$648: P_{22904} = (23, 10, 21, 1)$
$649: P_{22927} = (14, 11, 21, 1)$
$650: P_{22980} = (3, 13, 21, 1)$
$651: P_{22996} = (19, 13, 21, 1)$
$652: P_{23006} = (29, 13, 21, 1)$
$653: P_{23011} = (2, 14, 21, 1)$
$654: P_{23012} = (3, 14, 21, 1)$
$655: P_{23024} = (15, 14, 21, 1)$
$656: P_{23080} = (7, 16, 21, 1)$
$657: P_{23088} = (15, 16, 21, 1)$
$658: P_{23097} = (24, 16, 21, 1)$
$659: P_{23136} = (31, 17, 21, 1)$

$660 : P_{23177} = (8, 19, 21, 1)$

$661 : P_{23220} = (19, 20, 21, 1)$

$662 : P_{23264} = (31, 21, 21, 1)$

$663 : P_{23363} = (2, 25, 21, 1)$

$664 : P_{23366} = (5, 25, 21, 1)$

$665 : P_{23391} = (30, 25, 21, 1)$

$666 : P_{23397} = (4, 26, 21, 1)$

$667 : P_{23457} = (0, 28, 21, 1)$

$668 : P_{23465} = (8, 28, 21, 1)$

$669 : P_{23477} = (20, 28, 21, 1)$

$670 : P_{23496} = (7, 29, 21, 1)$

$671 : P_{23502} = (13, 29, 21, 1)$

$672 : P_{23512} = (23, 29, 21, 1)$

$673 : P_{23558} = (5, 31, 21, 1)$

$674 : P_{23643} = (26, 1, 22, 1)$

$675 : P_{23696} = (15, 3, 22, 1)$

$676 : P_{23715} = (2, 4, 22, 1)$

$677 : P_{23721} = (8, 4, 22, 1)$

$678 : P_{23727} = (14, 4, 22, 1)$

$679 : P_{23767} = (22, 5, 22, 1)$

$680 : P_{23795} = (18, 6, 22, 1)$

$681 : P_{23851} = (10, 8, 22, 1)$

$682 : P_{23888} = (15, 9, 22, 1)$

$683 : P_{23943} = (6, 11, 22, 1)$

$684 : P_{24004} = (3, 13, 22, 1)$

$685 : P_{24017} = (16, 13, 22, 1)$

$686 : P_{24031} = (30, 13, 22, 1)$

$687 : P_{24034} = (1, 14, 22, 1)$

$688 : P_{24036} = (3, 14, 22, 1)$

$689 : P_{24045} = (12, 14, 22, 1)$

$690 : P_{24099} = (2, 16, 22, 1)$

$691 : P_{24155} = (26, 17, 22, 1)$

$692 : P_{24172} = (11, 18, 22, 1)$

$693 : P_{24297} = (8, 22, 22, 1)$

$694 : P_{24331} = (10, 23, 22, 1)$

$695 : P_{24362} = (9, 24, 22, 1)$

$696 : P_{24385} = (0, 25, 22, 1)$

$697 : P_{24399} = (14, 25, 22, 1)$

$698 : P_{24408} = (23, 25, 22, 1)$

$699 : P_{24428} = (11, 26, 22, 1)$

$700 : P_{24465} = (16, 27, 22, 1)$

$701 : P_{24503} = (22, 28, 22, 1)$

$702 : P_{24519} = (6, 29, 22, 1)$

$703 : P_{24522} = (9, 29, 22, 1)$

$704 : P_{24531} = (18, 29, 22, 1)$

$705 : P_{24557} = (12, 30, 22, 1)$

$706 : P_{24607} = (30, 31, 22, 1)$

$707 : P_{24660} = (19, 1, 23, 1)$

$708 : P_{24683} = (10, 2, 23, 1)$

$709 : P_{24690} = (17, 2, 23, 1)$

$710 : P_{24698} = (25, 2, 23, 1)$

$711 : P_{24782} = (13, 5, 23, 1)$

$712 : P_{24909} = (12, 9, 23, 1)$

$713 : P_{24943} = (14, 10, 23, 1)$

$714 : P_{25014} = (21, 12, 23, 1)$

$715 : P_{25058} = (1, 14, 23, 1)$

$716 : P_{25059} = (2, 14, 23, 1)$

$717 : P_{25070} = (13, 14, 23, 1)$

$718 : P_{25097} = (8, 15, 23, 1)$

$719 : P_{25146} = (25, 16, 23, 1)$

$720 : P_{25183} = (30, 17, 23, 1)$

$721 : P_{25233} = (16, 19, 23, 1)$

$722 : P_{25234} = (17, 19, 23, 1)$

$723 : P_{25235} = (18, 19, 23, 1)$

$724 : P_{25257} = (8, 20, 23, 1)$

$725 : P_{25261} = (12, 20, 23, 1)$

$726 : P_{25265} = (16, 20, 23, 1)$

$727 : P_{25323} = (10, 22, 23, 1)$

$728 : P_{25354} = (9, 23, 23, 1)$

$729 : P_{25377} = (0, 24, 23, 1)$

$730 : P_{25391} = (14, 24, 23, 1)$

$731 : P_{25399} = (22, 24, 23, 1)$

$732 : P_{25411} = (2, 25, 23, 1)$

$733 : P_{25416} = (7, 25, 23, 1)$

$734 : P_{25437} = (28, 25, 23, 1)$

$735 : P_{25450} = (9, 26, 23, 1)$

$736 : P_{25491} = (18, 27, 23, 1)$

$737 : P_{25494} = (21, 27, 23, 1)$

$738 : P_{25501} = (28, 27, 23, 1)$

$739 : P_{25535} = (30, 28, 23, 1)$

$740 : P_{25576} = (7, 30, 23, 1)$

$741 : P_{25620} = (19, 31, 23, 1)$

$742 : P_{25673} = (8, 1, 24, 1)$

$743 : P_{25706} = (9, 2, 24, 1)$

$744 : P_{25720} = (23, 2, 24, 1)$

$745 : P_{25725} = (28, 2, 24, 1)$

$746 : P_{25740} = (11, 3, 24, 1)$

$747 : P_{25767} = (6, 4, 24, 1)$

$748 : P_{25773} = (12, 4, 24, 1)$

$749 : P_{25775} = (14, 4, 24, 1)$

$750 : P_{25829} = (4, 6, 24, 1)$

$751 : P_{25846} = (21, 6, 24, 1)$

$752 : P_{25848} = (23, 6, 24, 1)$

$753 : P_{25857} = (0, 7, 24, 1)$

$754 : P_{25882} = (25, 7, 24, 1)$

$755 : P_{25887} = (30, 7, 24, 1)$

$756 : P_{25898} = (9, 8, 24, 1)$

$757 : P_{25901} = (12, 8, 24, 1)$

$758 : P_{25902} = (13, 8, 24, 1)$

$759 : P_{26011} = (26, 11, 24, 1)$

$760 : P_{26036} = (19, 12, 24, 1)$

$761 : P_{26055} = (6, 13, 24, 1)$

$762 : P_{26111} = (30, 14, 24, 1)$

$763 : P_{26204} = (27, 17, 24, 1)$

$764 : P_{26217} = (8, 18, 24, 1)$

$765 : P_{26262} = (21, 19, 24, 1)$

$766 : P_{26388} = (19, 23, 24, 1)$

$767 : P_{26412} = (11, 24, 24, 1)$

$768 : P_{26447} = (14, 25, 24, 1)$
$769 : P_{26493} = (28, 26, 24, 1)$
$770 : P_{26571} = (10, 29, 24, 1)$
$771 : P_{26574} = (13, 29, 24, 1)$
$772 : P_{26587} = (26, 29, 24, 1)$
$773 : P_{26594} = (1, 30, 24, 1)$
$774 : P_{26597} = (4, 30, 24, 1)$
$775 : P_{26620} = (27, 30, 24, 1)$
$776 : P_{26635} = (10, 31, 24, 1)$
$777 : P_{26692} = (3, 1, 25, 1)$
$778 : P_{26734} = (13, 2, 25, 1)$
$779 : P_{26768} = (15, 3, 25, 1)$
$780 : P_{26848} = (31, 5, 25, 1)$
$781 : P_{26849} = (0, 6, 25, 1)$
$782 : P_{26873} = (24, 6, 25, 1)$
$783 : P_{26879} = (30, 6, 25, 1)$
$784 : P_{26892} = (11, 7, 25, 1)$
$785 : P_{26960} = (15, 9, 25, 1)$
$786 : P_{26991} = (14, 10, 25, 1)$
$787 : P_{27040} = (31, 11, 25, 1)$
$788 : P_{27044} = (3, 12, 25, 1)$
$789 : P_{27077} = (4, 13, 25, 1)$
$790 : P_{27157} = (20, 15, 25, 1)$
$791 : P_{27173} = (4, 16, 25, 1)$
$792 : P_{27179} = (10, 16, 25, 1)$
$793 : P_{27199} = (30, 16, 25, 1)$
$794 : P_{27226} = (25, 17, 25, 1)$
$795 : P_{27252} = (19, 18, 25, 1)$
$796 : P_{27291} = (26, 19, 25, 1)$
$797 : P_{27306} = (9, 20, 25, 1)$
$798 : P_{27370} = (9, 22, 25, 1)$
$799 : P_{27372} = (11, 22, 25, 1)$
$800 : P_{27381} = (20, 22, 25, 1)$
$801 : P_{27418} = (25, 23, 25, 1)$
$802 : P_{27439} = (14, 24, 25, 1)$
$803 : P_{27467} = (10, 25, 25, 1)$
$804 : P_{27526} = (5, 27, 25, 1)$
$805 : P_{27534} = (13, 27, 25, 1)$
$806 : P_{27540} = (19, 27, 25, 1)$
$807 : P_{27618} = (1, 30, 25, 1)$
$808 : P_{27622} = (5, 30, 25, 1)$
$809 : P_{27643} = (26, 30, 25, 1)$
$810 : P_{27716} = (3, 1, 26, 1)$
$811 : P_{27750} = (5, 2, 26, 1)$
$812 : P_{27777} = (0, 3, 26, 1)$
$813 : P_{27801} = (24, 3, 26, 1)$
$814 : P_{27804} = (27, 3, 26, 1)$
$815 : P_{27854} = (13, 5, 26, 1)$
$816 : P_{27926} = (21, 7, 26, 1)$
$817 : P_{27973} = (4, 9, 26, 1)$
$818 : P_{28068} = (3, 12, 26, 1)$
$819 : P_{28102} = (5, 13, 26, 1)$
$820 : P_{28141} = (12, 14, 26, 1)$
$821 : P_{28142} = (13, 14, 26, 1)$

$822 : P_{28144} = (15, 14, 26, 1)$
$823 : P_{28201} = (8, 16, 26, 1)$
$824 : P_{28208} = (15, 16, 26, 1)$
$825 : P_{28216} = (23, 16, 26, 1)$
$826 : P_{28377} = (24, 21, 26, 1)$
$827 : P_{28425} = (8, 23, 26, 1)$
$828 : P_{28450} = (1, 24, 26, 1)$
$829 : P_{28502} = (21, 25, 26, 1)$
$830 : P_{28568} = (23, 27, 26, 1)$
$831 : P_{28613} = (4, 29, 26, 1)$
$832 : P_{28653} = (12, 30, 26, 1)$
$833 : P_{28751} = (14, 1, 27, 1)$
$834 : P_{28769} = (0, 2, 27, 1)$
$835 : P_{28793} = (24, 2, 27, 1)$
$836 : P_{28795} = (26, 2, 27, 1)$
$837 : P_{28869} = (4, 5, 27, 1)$
$838 : P_{28881} = (16, 5, 27, 1)$
$839 : P_{28882} = (17, 5, 27, 1)$
$840 : P_{28912} = (15, 6, 27, 1)$
$841 : P_{28913} = (16, 6, 27, 1)$
$842 : P_{28922} = (25, 6, 27, 1)$
$843 : P_{28952} = (23, 7, 27, 1)$
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$845 : P_{29005} = (12, 9, 27, 1)$
$846 : P_{29071} = (14, 11, 27, 1)$
$847 : P_{29128} = (7, 13, 27, 1)$
$848 : P_{29139} = (18, 13, 27, 1)$
$849 : P_{29145} = (24, 13, 27, 1)$
$850 : P_{29244} = (27, 16, 27, 1)$
$851 : P_{29256} = (7, 17, 27, 1)$
$852 : P_{29308} = (27, 18, 27, 1)$
$853 : P_{29338} = (25, 19, 27, 1)$
$854 : P_{29349} = (4, 20, 27, 1)$
$855 : P_{29357} = (12, 20, 27, 1)$
$856 : P_{29373} = (28, 20, 27, 1)$
$857 : P_{29424} = (15, 22, 27, 1)$
$858 : P_{29474} = (1, 24, 27, 1)$
$859 : P_{29523} = (18, 25, 27, 1)$
$860 : P_{29527} = (22, 25, 27, 1)$
$861 : P_{29534} = (29, 25, 27, 1)$
$862 : P_{29560} = (23, 26, 27, 1)$
$863 : P_{29618} = (17, 28, 27, 1)$
$864 : P_{29687} = (22, 30, 27, 1)$
$865 : P_{29726} = (29, 31, 27, 1)$
$866 : P_{29791} = (30, 1, 28, 1)$
$867 : P_{29841} = (16, 3, 28, 1)$
$868 : P_{29879} = (22, 4, 28, 1)$
$869 : P_{29903} = (14, 5, 28, 1)$
$870 : P_{29925} = (4, 6, 28, 1)$
$871 : P_{29938} = (17, 6, 28, 1)$
$872 : P_{29940} = (19, 6, 28, 1)$
$873 : P_{29995} = (10, 8, 28, 1)$
$874 : P_{30050} = (1, 10, 28, 1)$
$875 : P_{30065} = (16, 10, 28, 1)$

$876: P_{30076} = (27, 10, 28, 1)$
$877: P_{30100} = (19, 11, 28, 1)$
$878: P_{30131} = (18, 12, 28, 1)$
$879: P_{30152} = (7, 13, 28, 1)$
$880: P_{30166} = (21, 13, 28, 1)$
$881: P_{30176} = (31, 13, 28, 1)$
$882: P_{30201} = (24, 14, 28, 1)$
$883: P_{30239} = (30, 15, 28, 1)$
$884: P_{30280} = (7, 17, 28, 1)$
$885: P_{30322} = (17, 18, 28, 1)$
$886: P_{30415} = (14, 21, 28, 1)$
$887: P_{30454} = (21, 22, 28, 1)$
$888: P_{30457} = (24, 22, 28, 1)$
$889: P_{30460} = (27, 22, 28, 1)$
$890: P_{30465} = (0, 23, 28, 1)$
$891: P_{30475} = (10, 23, 28, 1)$
$892: P_{30494} = (29, 23, 28, 1)$
$893: P_{30598} = (5, 27, 28, 1)$
$894: P_{30601} = (8, 27, 28, 1)$
$895: P_{30615} = (22, 27, 28, 1)$
$896: P_{30643} = (18, 28, 28, 1)$
$897: P_{30665} = (8, 29, 28, 1)$
$898: P_{30693} = (4, 30, 28, 1)$
$899: P_{30694} = (5, 30, 28, 1)$
$900: P_{30720} = (31, 30, 28, 1)$
$901: P_{30797} = (12, 1, 29, 1)$
$902: P_{30827} = (10, 2, 29, 1)$
$903: P_{30836} = (19, 2, 29, 1)$
$904: P_{30844} = (27, 2, 29, 1)$
$905: P_{30878} = (29, 3, 29, 1)$
$906: P_{30908} = (27, 4, 29, 1)$
$907: P_{30925} = (12, 5, 29, 1)$
$908: P_{31066} = (25, 9, 29, 1)$
$909: P_{31074} = (1, 10, 29, 1)$
$910: P_{31090} = (17, 10, 29, 1)$
$911: P_{31099} = (26, 10, 29, 1)$
$912: P_{31146} = (9, 12, 29, 1)$
$913: P_{31173} = (4, 13, 29, 1)$
$914: P_{31218} = (17, 14, 29, 1)$
$915: P_{31247} = (14, 15, 29, 1)$
$916: P_{31269} = (4, 16, 29, 1)$
$917: P_{31279} = (14, 16, 29, 1)$
$918: P_{31291} = (26, 16, 29, 1)$
$919: P_{31340} = (11, 18, 29, 1)$
$920: P_{31369} = (8, 19, 29, 1)$
$921: P_{31411} = (18, 20, 29, 1)$
$922: P_{31418} = (25, 20, 29, 1)$
$923: P_{31424} = (31, 20, 29, 1)$
$924: P_{31454} = (29, 21, 29, 1)$
$925: P_{31457} = (0, 22, 29, 1)$
$926: P_{31467} = (10, 22, 29, 1)$
$927: P_{31485} = (28, 22, 29, 1)$
$928: P_{31507} = (18, 23, 29, 1)$
$929: P_{31584} = (31, 25, 29, 1)$

$930: P_{31596} = (11, 26, 29, 1)$
$931: P_{31657} = (8, 28, 29, 1)$
$932: P_{31700} = (19, 29, 29, 1)$
$933: P_{31754} = (9, 31, 29, 1)$
$934: P_{31832} = (23, 1, 30, 1)$
$935: P_{31911} = (6, 4, 30, 1)$
$936: P_{31913} = (8, 4, 30, 1)$
$937: P_{31915} = (10, 4, 30, 1)$
$938: P_{31981} = (12, 6, 30, 1)$
$939: P_{32050} = (17, 8, 30, 1)$
$940: P_{32069} = (4, 9, 30, 1)$
$941: P_{32139} = (10, 11, 30, 1)$
$942: P_{32162} = (1, 12, 30, 1)$
$943: P_{32184} = (23, 12, 30, 1)$
$944: P_{32187} = (26, 12, 30, 1)$
$945: P_{32199} = (6, 13, 30, 1)$
$946: P_{32246} = (21, 14, 30, 1)$
$947: P_{32385} = (0, 19, 30, 1)$
$948: P_{32397} = (12, 19, 30, 1)$
$949: P_{32416} = (31, 19, 30, 1)$
$950: P_{32489} = (8, 22, 30, 1)$
$951: P_{32522} = (9, 23, 30, 1)$
$952: P_{32571} = (26, 24, 30, 1)$
$953: P_{32618} = (9, 26, 30, 1)$
$954: P_{32709} = (4, 29, 30, 1)$
$955: P_{32758} = (21, 30, 30, 1)$
$956: P_{32786} = (17, 31, 30, 1)$
$957: P_{32854} = (21, 1, 31, 1)$
$958: P_{32870} = (5, 2, 31, 1)$
$959: P_{32907} = (10, 3, 31, 1)$
$960: P_{32944} = (15, 4, 31, 1)$
$961: P_{32948} = (19, 4, 31, 1)$
$962: P_{32953} = (24, 4, 31, 1)$
$963: P_{32965} = (4, 5, 31, 1)$
$964: P_{32981} = (20, 5, 31, 1)$
$965: P_{32982} = (21, 5, 31, 1)$
$966: P_{33021} = (28, 6, 31, 1)$
$967: P_{33035} = (10, 7, 31, 1)$
$968: P_{33080} = (23, 8, 31, 1)$
$969: P_{33111} = (22, 9, 31, 1)$
$970: P_{33133} = (12, 10, 31, 1)$
$971: P_{33186} = (1, 12, 31, 1)$
$972: P_{33207} = (22, 12, 31, 1)$
$973: P_{33212} = (27, 12, 31, 1)$
$974: P_{33222} = (5, 13, 31, 1)$
$975: P_{33289} = (8, 15, 31, 1)$
$976: P_{33377} = (0, 18, 31, 1)$
$977: P_{33389} = (12, 18, 31, 1)$
$978: P_{33407} = (30, 18, 31, 1)$
$979: P_{33432} = (23, 19, 31, 1)$
$980: P_{33445} = (4, 20, 31, 1)$
$981: P_{33449} = (8, 20, 31, 1)$
$982: P_{33465} = (24, 20, 31, 1)$
$983: P_{33501} = (28, 21, 31, 1)$

$984 : P_{33578} = (9, 24, 31, 1)$

$985 : P_{33618} = (17, 25, 31, 1)$

$986 : P_{33716} = (19, 28, 31, 1)$

$987 : P_{33738} = (9, 29, 31, 1)$

$988 : P_{33744} = (15, 29, 31, 1)$

$989 : P_{33756} = (27, 29, 31, 1)$

$990 : P_{33778} = (17, 30, 31, 1)$

$991 : P_{33813} = (20, 31, 31, 1)$

Line Intersection Graph

```
  |0 1 2 3
 ─┼───────
 0|0 1 1 1
 1|1 0 0 0
 2|1 0 0 1
 3|1 0 1 0
```

Neighbor sets in the line intersection graph:

Line 0 intersects

Line	ℓ_1	ℓ_2	ℓ_3
in point	P_2	P_{2082}	P_{2082}

Line 1 intersects

Line	ℓ_0
in point	P_2

Line 2 intersects

Line	ℓ_0	ℓ_3
in point	P_{2082}	P_{2082}

Line 3 intersects

Line	ℓ_0	ℓ_2
in point	P_{2082}	P_{2082}

The surface has 1121 points:

Too many to print.