# Rank-74099 over GF(32)

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## The equation

The equation of the surface is :

$$X_0^2X_1 + X_0^2X_2 + X_0^2X_3 + X_1^2X_2 + X_0X_3^2 + X_0X_1X_2 = 0$$

( 0, 0, 0, 0, 1, 1, 1, 0, 1, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0 )
The point rank of the equation over GF(32) is -2078243803

## General information

| | |
|---|---|
| Number of lines | 2 |
| Number of points | 1089 |
| Number of singular points | 1 |
| Number of Eckardt points | 0 |
| Number of double points | 1 |
| Number of single points | 64 |
| Number of points off lines | 1024 |
| Number of Hesse planes | 0 |
| Number of axes | 0 |
| Type of points on lines | $33^2$ |
| Type of lines on points | 2, $1^{64}$, $0^{1024}$ |

### Singular Points

The surface has 1 singular points:

$0: \ P_2 = \mathbf{P}(0,0,1,0) = \mathbf{P}(0,0,1,0)$

## The 2 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \left[\begin{array}{cccc} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]_{1082400} = \left[\begin{array}{cccc} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]_{1082400} = \mathbf{Pl}(0,0,0,1,0,0)_{65}$$

$$\ell_1 = \left[\begin{array}{cccc} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]_{1083424} = \left[\begin{array}{cccc} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}\right]_{1083424} = \mathbf{Pl}(0,1,0,0,0,0)_1$$

Rank of lines: ( 1082400, 1083424 )
Rank of points on Klein quadric: ( 65, 1 )

### Eckardt Points

The surface has 0 Eckardt points:

### Double Points

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

$P_3 = (0,0,0,1) = \ell_0 \cap \ell_1$

### Single Points

The surface has 64 single points:
The single points on the surface are:

0 : $P_1 = (0,1,0,0)$ lies on line $\ell_0$
1 : $P_2 = (0,0,1,0)$ lies on line $\ell_1$
2 : $P_{1090} = (0,1,0,1)$ lies on line $\ell_0$
3 : $P_{1122} = (0,2,0,1)$ lies on line $\ell_0$
4 : $P_{1154} = (0,3,0,1)$ lies on line $\ell_0$
5 : $P_{1186} = (0,4,0,1)$ lies on line $\ell_0$
6 : $P_{1218} = (0,5,0,1)$ lies on line $\ell_0$
7 : $P_{1250} = (0,6,0,1)$ lies on line $\ell_0$
8 : $P_{1282} = (0,7,0,1)$ lies on line $\ell_0$
9 : $P_{1314} = (0,8,0,1)$ lies on line $\ell_0$
10 : $P_{1346} = (0,9,0,1)$ lies on line $\ell_0$
11 : $P_{1378} = (0,10,0,1)$ lies on line $\ell_0$
12 : $P_{1410} = (0,11,0,1)$ lies on line $\ell_0$
13 : $P_{1442} = (0,12,0,1)$ lies on line $\ell_0$
14 : $P_{1474} = (0,13,0,1)$ lies on line $\ell_0$
15 : $P_{1506} = (0,14,0,1)$ lies on line $\ell_0$
16 : $P_{1538} = (0,15,0,1)$ lies on line $\ell_0$
17 : $P_{1570} = (0,16,0,1)$ lies on line $\ell_0$
18 : $P_{1602} = (0,17,0,1)$ lies on line $\ell_0$
19 : $P_{1634} = (0,18,0,1)$ lies on line $\ell_0$
20 : $P_{1666} = (0,19,0,1)$ lies on line $\ell_0$
21 : $P_{1698} = (0,20,0,1)$ lies on line $\ell_0$
22 : $P_{1730} = (0,21,0,1)$ lies on line $\ell_0$
23 : $P_{1762} = (0,22,0,1)$ lies on line $\ell_0$
24 : $P_{1794} = (0,23,0,1)$ lies on line $\ell_0$
25 : $P_{1826} = (0,24,0,1)$ lies on line $\ell_0$
26 : $P_{1858} = (0,25,0,1)$ lies on line $\ell_0$
27 : $P_{1890} = (0,26,0,1)$ lies on line $\ell_0$
28 : $P_{1922} = (0,27,0,1)$ lies on line $\ell_0$
29 : $P_{1954} = (0,28,0,1)$ lies on line $\ell_0$
30 : $P_{1986} = (0,29,0,1)$ lies on line $\ell_0$
31 : $P_{2018} = (0,30,0,1)$ lies on line $\ell_0$
32 : $P_{2050} = (0,31,0,1)$ lies on line $\ell_0$
33 : $P_{2082} = (0,0,1,1)$ lies on line $\ell_1$
34 : $P_{3105} = (0,0,2,1)$ lies on line $\ell_1$
35 : $P_{4129} = (0,0,3,1)$ lies on line $\ell_1$
36 : $P_{5153} = (0,0,4,1)$ lies on line $\ell_1$
37 : $P_{6177} = (0,0,5,1)$ lies on line $\ell_1$
38 : $P_{7201} = (0,0,6,1)$ lies on line $\ell_1$
39 : $P_{8225} = (0,0,7,1)$ lies on line $\ell_1$
40 : $P_{9249} = (0,0,8,1)$ lies on line $\ell_1$
41 : $P_{10273} = (0,0,9,1)$ lies on line $\ell_1$
42 : $P_{11297} = (0,0,10,1)$ lies on line $\ell_1$
43 : $P_{12321} = (0,0,11,1)$ lies on line $\ell_1$
44 : $P_{13345} = (0,0,12,1)$ lies on line $\ell_1$
45 : $P_{14369} = (0,0,13,1)$ lies on line $\ell_1$
46 : $P_{15393} = (0,0,14,1)$ lies on line $\ell_1$
47 : $P_{16417} = (0,0,15,1)$ lies on line $\ell_1$
48 : $P_{17441} = (0,0,16,1)$ lies on line $\ell_1$
49 : $P_{18465} = (0,0,17,1)$ lies on line $\ell_1$
50 : $P_{19489} = (0,0,18,1)$ lies on line $\ell_1$
51 : $P_{20513} = (0,0,19,1)$ lies on line $\ell_1$
52 : $P_{21537} = (0,0,20,1)$ lies on line $\ell_1$
53 : $P_{22561} = (0,0,21,1)$ lies on line $\ell_1$
54 : $P_{23585} = (0,0,22,1)$ lies on line $\ell_1$
55 : $P_{24609} = (0,0,23,1)$ lies on line $\ell_1$
56 : $P_{25633} = (0,0,24,1)$ lies on line $\ell_1$
57 : $P_{26657} = (0,0,25,1)$ lies on line $\ell_1$

58 : $P_{27681} = (0, 0, 26, 1)$ lies on line $\ell_1$
59 : $P_{28705} = (0, 0, 27, 1)$ lies on line $\ell_1$
60 : $P_{29729} = (0, 0, 28, 1)$ lies on line $\ell_1$
61 : $P_{30753} = (0, 0, 29, 1)$ lies on line $\ell_1$
62 : $P_{31777} = (0, 0, 30, 1)$ lies on line $\ell_1$
63 : $P_{32801} = (0, 0, 31, 1)$ lies on line $\ell_1$

The single points on the surface are:

#### Points on surface but on no line

The surface has 1024 points not on any line:
Too many to print.

## Line Intersection Graph

| | 0 | 1 |
|---|---|---|
| 0 | 0 | 1 |
| 1 | 1 | 0 |

Neighbor sets in the line intersection graph:
Line 0 intersects

| Line | $\ell_1$ |
|---|---|
| in point | $P_3$ |

Line 1 intersects

| Line | $\ell_0$ |
|---|---|
| in point | $P_3$ |

The surface has 1089 points:
Too many to print.