

# Rank-65612 over GF(2)

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## The equation

The equation of the surface is :

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

( 1, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0 )

The point rank of the equation over GF(2) is 65612

## General information

Number of lines	1
Number of points	5
Number of singular points	2
Number of Eckardt points	0
Number of double points	0
Number of single points	3
Number of points off lines	2
Number of Hesse planes	0
Number of axes	0
Type of points on lines	3
Type of lines on points	$1^3, 0^2$

## Singular Points

The surface has 2 singular points:

$$\begin{aligned} 0 : P_1 &= \mathbf{P}(0, 1, 0, 0) = \mathbf{P}(0, 1, 0, 0) \\ 1 : P_2 &= \mathbf{P}(0, 0, 1, 0) = \mathbf{P}(0, 0, 1, 0) \end{aligned}$$

## The 1 Lines

The lines and their Pluecker coordinates are:

$$\ell_0 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{28} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}_{28} = \mathbf{Pl}(0, 0, 0, 0, 0, 1)_{19}$$

Rank of lines: ( 28 )

Rank of points on Klein quadric: ( 19 )

### Eckardt Points

The surface has 0 Eckardt points:

### Double Points

The surface has 0 Double points:

The double points on the surface are:

### Single Points

The surface has 3 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  $\ell_0$

2 :  $P_7 = (0, 1, 1, 0)$  lies on line  $\ell_0$

The single points on the surface are:

### Points on surface but on no line

The surface has 2 points not on any line:

The points on the surface but not on lines are:

0 :  $P_4 = (1, 1, 1, 1)$

1 :  $P_8 = (1, 1, 1, 0)$

### Line Intersection Graph

$$\begin{array}{c|c} 0 & \\ \hline 0 & 0 \end{array}$$

Neighbor sets in the line intersection graph:

Line 0 intersects

Line
in point

The surface has 5 points:

The points on the surface are:

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

1 :  $P_2 = (0, 0, 1, 0)$

2 :  $P_4 = (1, 1, 1, 1)$

3 :  $P_7 = (0, 1, 1, 0)$

4 :  $P_8 = (1, 1, 1, 0)$