1 BLT set 3 over GF(31)

Points on the quadric $x_0^2 + x_1x_2 + x_3x_4$:

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

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

$P_3 = (0, 1, 10, 30, 10)$

$P_4 = (0, 1, 18, 15, 5)$

$P_5 = (0, 1, 8, 10, 24)$

$P_6 = (0, 1, 4, 22, 28)$

$P_7 = (0, 1, 20, 8, 13)$

$P_8 = (0, 1, 1, 20, 17)$

$P_9 = (1, 11, 21, 5, 28)$

$P_{10} = (1, 27, 29, 8, 26)$

$P_{11} = (1, 4, 2, 15, 18)$

$P_{12} = (1, 20, 10, 9, 19)$

$P_{13} = (1, 26, 30, 19, 16)$

$P_{14} = (1, 24, 11, 22, 26)$

$P_{15} = (1, 5, 1, 14, 4)$

$P_{16} = (1, 7, 20, 15, 3)$

$P_{17} = (1, 20, 2, 16, 11)$

$P_{18} = (1, 27, 12, 19, 9)$

$P_{19} = (1, 4, 19, 4, 4)$

$P_{20} = (1, 11, 29, 29, 5)$

$P_{21} = (1, 25, 1, 28, 19)$

$P_{22} = (1, 4, 20, 16, 24)$

$P_{23} = (1, 27, 11, 21, 5)$

$P_{24} = (1, 6, 30, 5, 1)$

$P_{25} = (1, 6, 15, 22, 17)$

$P_{26} = (1, 27, 21, 20, 15)$

$P_{27} = (1, 25, 16, 11, 3)$

$P_{28} = (1, 4, 10, 17, 14)$

$P_{29} = (1, 10, 10, 2, 27)$

$P_{30} = (1, 2, 2, 26, 1)$

$P_{31} = (1, 21, 21, 12, 20)$

$P_{32} = (1, 29, 29, 28, 12)$

Stabilizer of order 96 is generated by:

$$g_1 = \begin{pmatrix} 2 & 0 & 0 & 3 & 30 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \\ 15 & 0 & 0 & 14 & 26 \\ 17 & 0 & 0 & 17 & 14 \end{pmatrix}$$

$$g_2 = \begin{pmatrix} 29 & 0 & 0 & 28 & 1 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \\ 16 & 0 & 0 & 16 & 15 \\ 14 & 0 & 0 & 11 & 16 \end{pmatrix}$$

$$g_3 = \begin{pmatrix} 11 & 0 & 0 & 22 & 3 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \\ 17 & 0 & 0 & 25 & 12 \\ 11 & 0 & 0 & 15 & 25 \end{pmatrix}$$

$$g_4 = \begin{pmatrix} 30 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 4 & 1 & 9 & 3 \\ 0 & 3 & 0 & 30 & 0 \\ 0 & 9 & 0 & 0 & 30 \end{pmatrix}$$

$$g_5 = \begin{pmatrix} 20 & 0 & 0 & 9 & 28 \\ 0 & 27 & 21 & 2 & 11 \\ 0 & 27 & 30 & 22 & 28 \\ 14 & 25 & 21 & 8 & 30 \\ 20 & 13 & 1 & 22 & 8 \end{pmatrix}$$

$$g_6 = \begin{pmatrix} 26 & 0 & 0 & 17 & 15 \\ 0 & 28 & 7 & 1 & 21 \\ 0 & 9 & 0 & 0 & 0 \\ 23 & 28 & 0 & 3 & 20 \\ 24 & 22 & 0 & 25 & 3 \end{pmatrix}$$

Induced action on the BLT-set:

The induced group has order 96 and is generated by:

g_1 =(9, 10)(11, 12)(13, 15)(17, 19)(18, 20)(21, 24)(25, 27)(29, 30)(31, 32)

g_2 =(9, 11)(10, 12)(14, 16)(17, 18)(19, 20)(22, 23)(26, 28)(29, 32)(30, 31)

g_3 =(9, 12)(13, 16)(14, 15)(17, 20)(21, 23)(22, 24)(25, 28)(26, 27)(29, 31)

g_4 =(2, 5)(3, 4)(6, 7)(9, 29)(10, 30)(11, 32)(12, 31)(13, 21)(14, 22)(15, 24)(16, 23)(17, 20)(18, 19)(25, 27)(26, 28)

g_5 =(1, 4, 3)(2, 5, 8)(9, 20, 31)(10, 19, 32, 11, 18, 30)(12, 17, 29)(13, 23, 25, 14, 24, 26)(15, 22, 27, 16, 21, 28)

g_6 =(1, 5, 4, 8, 3, 2)(9, 14, 20, 23, 31, 26)(10, 13, 18, 24, 32, 25)(11, 15, 19, 21, 30, 27)(12, 16, 17, 22, 29, 28)

Kernel has order 1 and is generated by:

There are 3 orbits on the BLT set.

The orbit length are $[24, 6, 2]$

The orbits are:

$O_0 = \{1, 2, 3, 4, 5, 8\}$ (length 6)

$O_1 = \{6, 7\}$ (length 2)

$O_2 = \{9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32\}$ (length 24)

The actions induced on the orbits are:

Induced action on orbit $O_0 = \{1, 2, 3, 4, 5, 8\}$ (length 6)

The induced group has order 12 and is generated by:

g_1 =id

g_2 =id

g_3 =id

g_4 =(2, 5)(3, 4)

g_5 =(1, 4, 3)(2, 5, 6)

g_6 =(1, 5, 4, 6, 3, 2)

Kernel has order 8 and is generated by:

$$b_1 = \begin{pmatrix} 11 & 0 & 0 & 22 & 3 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \\ 17 & 0 & 0 & 25 & 12 \\ 11 & 0 & 0 & 15 & 25 \end{pmatrix}$$

$$b_2 = \begin{pmatrix} 20 & 0 & 0 & 9 & 28 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \\ 14 & 0 & 0 & 5 & 29 \\ 20 & 0 & 0 & 13 & 5 \end{pmatrix}$$

$$b_3 = \begin{pmatrix} 2 & 0 & 0 & 3 & 30 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \\ 15 & 0 & 0 & 14 & 26 \\ 17 & 0 & 0 & 17 & 14 \end{pmatrix}$$

The kernel has 4341 orbits on the quadric.

The orbit length are $[8^{3379}, 4^{930}, 1^{32}]$

Induced action on orbit $O_{738} = \{1265, 2344, 8320, 24869\}$ (length 4)

The induced group has order 8 and is generated by:

g_1 =(3, 4)

g_2 =(1, 2)

g_3 =(1, 4)(2, 3)

Kernel has order 1 and is generated by:

Induced action on orbit $O_1 = \{6, 7\}$ (length 2)

The induced group has order 2 and is generated by:

g_1 =id

g_2 =id

g_3 =id

g_4 =(1, 2)

g_5 =id

g_6 =id

Kernel has order 48 and is generated by:

$$b_1 = \begin{pmatrix} 5 & 0 & 0 & 14 & 16 \\ 0 & 28 & 7 & 1 & 21 \\ 0 & 9 & 0 & 0 & 0 \\ 8 & 28 & 0 & 29 & 1 \\ 7 & 22 & 0 & 9 & 29 \end{pmatrix}$$

$$b_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$b_3 = \begin{pmatrix} 0 & 0 & 0 & 20 & 14 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 24 & 0 & 0 & 16 & 26 \\ 21 & 0 & 0 & 17 & 16 \end{pmatrix}$$

$$b_4 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$b_5 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$b_6 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$b_7 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$b_8 = \begin{pmatrix} 20 & 0 & 0 & 9 & 28 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \\ 14 & 0 & 0 & 5 & 29 \\ 20 & 0 & 0 & 13 & 5 \end{pmatrix}$$

The kernel has 729 orbits on the quadric.

The orbit length are $[48^{560}, 24^{160}, 16^2, 6^5, 1^2]$

Induced action on orbit $O_0 = \{1, 2, 185, 186, 187, 201\}$ (length 6)

The induced group has order 6 and is generated by:

g_1 =(1, 5, 4, 6, 3, 2)

g_2 =id

g_3 =id

g_4 =id

g_5 =id

g_6 =id

g_7 =id

g_8 =id

Kernel has order 8 and is generated by:

$$b_1 = \begin{pmatrix} 0 & 0 & 0 & 11 & 17 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 7 & 0 & 0 & 16 & 26 \\ 10 & 0 & 0 & 17 & 16 \end{pmatrix}$$

$$b_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$b_3 = \begin{pmatrix} 29 & 0 & 0 & 28 & 1 \\ 0 & 30 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \\ 16 & 0 & 0 & 16 & 15 \\ 14 & 0 & 0 & 11 & 16 \end{pmatrix}$$

The kernel has 4341 orbits on the quadric.

The orbit length are $[8^{3379}, 4^{930}, 1^{32}]$

Induced action on orbit $O_{738} = \{1265, 2344, 8320, 24869\}$ (length 4)

The induced group has order 8 and is generated by:

g_1 =(1, 3, 2, 4)

g_2 =id

g_3 =(1, 3)(2, 4)

Kernel has order 1 and is generated by:

Induced action on orbit $O_2 = \{9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 3$
(length 24)

The induced group has order 96 and is generated by:

g_1 =(1, 2)(3, 4)(5, 7)(9, 11)(10, 12)(13, 16)(17, 19)(21, 22)(23, 24)

g_2 =(1, 3)(2, 4)(6, 8)(9, 10)(11, 12)(14, 15)(18, 20)(21, 24)(22, 23)

g_3 =(1, 4)(5, 8)(6, 7)(9, 12)(13, 15)(14, 16)(17, 20)(18, 19)(21, 23)

g_4 =(1, 21)(2, 22)(3, 24)(4, 23)(5, 13)(6, 14)(7, 16)(8, 15)(9, 12)(10, 11)(17, 19)(18, 20)

g_5 =(1, 12, 23)(2, 11, 24, 3, 10, 22)(4, 9, 21)(5, 15, 17, 6, 16, 18)(7, 14, 19, 8, 13, 20)

g_6 =(1, 6, 12, 15, 23, 18)(2, 5, 10, 16, 24, 17)(3, 7, 11, 13, 22, 19)(4, 8, 9, 14, 21, 20)

Kernel has order 1 and is generated by: