

# 1 BLT set 3 over GF(37)

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

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

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

$$P_3 = (0, 1, 18, 36, 18)$$

$$P_4 = (0, 1, 23, 18, 9)$$

$$P_5 = (0, 1, 17, 22, 11)$$

$$P_6 = (0, 1, 5, 16, 2)$$

$$P_7 = (1, 30, 35, 19, 7)$$

$$P_8 = (1, 16, 18, 7, 1)$$

$$P_9 = (1, 4, 35, 6, 32)$$

$$P_{10} = (1, 13, 28, 14, 3)$$

$$P_{11} = (1, 2, 25, 30, 2)$$

$$P_{12} = (1, 15, 12, 23, 5)$$

$$P_{13} = (1, 31, 4, 5, 12)$$

$$P_{14} = (1, 19, 21, 16, 12)$$

$$P_{15} = (1, 18, 34, 23, 20)$$

$$P_{16} = (1, 3, 32, 18, 9)$$

$$P_{17} = (1, 24, 1, 11, 28)$$

$$P_{18} = (1, 1, 35, 10, 26)$$

$$P_{19} = (1, 19, 4, 4, 27)$$

$$P_{20} = (1, 36, 17, 28, 27)$$

$$P_{21} = (1, 32, 11, 9, 6)$$

$$P_{22} = (1, 15, 25, 35, 3)$$

$$P_{23} = (1, 34, 14, 22, 17)$$

$$P_{24} = (1, 9, 15, 27, 21)$$

$$P_{25} = (1, 10, 8, 18, 14)$$

$$P_{26} = (1, 12, 19, 6, 5)$$

$$P_{27} = (1, 15, 26, 17, 14)$$

$$P_{28} = (1, 1, 32, 23, 5)$$

$$P_{29} = (1, 28, 24, 36, 7)$$

$$P_{30} = (1, 27, 15, 8, 14)$$

$$P_{31} = (1, 24, 3, 8, 14)$$

$$P_{32} = (1, 24, 36, 2, 30)$$

$$P_{33} = (1, 25, 5, 24, 4)$$

$$P_{34} = (1, 22, 36, 4, 33)$$

$$P_{35} = (1, 5, 26, 5, 33)$$

$$P_{36} = (1, 1, 19, 7, 13)$$

$$P_{37} = (1, 12, 32, 2, 11)$$

$$P_{38} = (1, 32, 30, 18, 35)$$

Stabilizer of order 4 is generated by:

$$g_1 = \begin{pmatrix} 25 & 14 & 7 & 10 & 24 \\ 22 & 10 & 29 & 28 & 12 \\ 7 & 31 & 10 & 13 & 35 \\ 12 & 35 & 12 & 14 & 2 \\ 5 & 13 & 28 & 33 & 14 \end{pmatrix}$$

$$g_2 = \begin{pmatrix} 0 & 12 & 3 & 18 & 33 \\ 18 & 11 & 6 & 1 & 17 \\ 30 & 23 & 10 & 12 & 23 \\ 15 & 10 & 22 & 22 & 5 \\ 30 & 34 & 6 & 21 & 32 \end{pmatrix}$$

Induced action on the BLT-set:

The induced group has order 4 and is generated by:

$$g_1 = (1, 31)(2, 12)(3, 8)(4, 6)(5, 37)(7, 36)(9, 17)(10, 28)(11, 25)(13, 14)(16, 33)(18, 32)(19, 22)(20, 26)(21, 30)(24, 35)(27, 34)(29, 38)$$

$$g_2 = (1, 22, 31, 19)(2, 11, 12, 25)(3, 33, 8, 16)(4, 18, 6, 32)(5, 30, 37, 21)(7, 10, 36, 28)(9, 20,$$

17, 26)(13, 35, 14, 24)(15, 23)(27, 29, 34, 38)

group order is small, so we list all elements  $a_1 = \text{id}$

$a_2 = (1, 31)(2, 12)(3, 8)(4, 6)(5, 37)(7, 36)(9, 17)(10, 28)(11, 25)(13, 14)(16, 33)(18, 32)(19, 22)(20, 26)(21, 30)(24, 35)(27, 34)(29, 38)$

$a_3 = (1, 22, 31, 19)(2, 11, 12, 25)(3, 33, 8, 16)(4, 18, 6, 32)(5, 30, 37, 21)(7, 10, 36, 28)(9, 20, 17, 26)(13, 35, 14, 24)(15, 23)(27, 29, 34, 38)$

$a_4 = (1, 19, 31, 22)(2, 25, 12, 11)(3, 16, 8, 33)(4, 32, 6, 18)(5, 21, 37, 30)(7, 28, 36, 10)(9, 26, 17, 20)(13, 24, 14, 35)(15, 23)(27, 38, 34, 29)$

Kernel has order 1 and is generated by:

There are 10 orbits on the BLT set.

The orbit length are  $[4^9, 2]$

The orbits are:

$O_0 = \{1, 19, 22, 31\}$  (length 4)

$O_1 = \{2, 11, 12, 25\}$  (length 4)

$O_2 = \{3, 8, 16, 33\}$  (length 4)

$O_3 = \{4, 6, 18, 32\}$  (length 4)

$O_4 = \{5, 21, 30, 37\}$  (length 4)

$O_5 = \{7, 10, 28, 36\}$  (length 4)

$O_6 = \{9, 17, 20, 26\}$  (length 4)

$O_7 = \{13, 14, 24, 35\}$  (length 4)

$O_8 = \{15, 23\}$  (length 2)

$O_9 = \{27, 29, 34, 38\}$  (length 4)

The actions induced on the orbits are:

Induced action on orbit  $O_0 = \{1, 19, 22, 31\}$  (length 4)

The induced group has order 4 and is generated by:

$g_1 = (1, 4)(2, 3)$

$g_2 = (1, 3, 4, 2)$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 4)(2, 3)$$

$$a_3 = (1, 3, 4, 2)$$

$$a_4 = (1, 2, 4, 3)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_1 = \{2, 11, 12, 25\}$  (length 4)

The induced group has order 4 and is generated by:

$$g_1 = (1, 3)(2, 4)$$

$$g_2 = (1, 2, 3, 4)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 3)(2, 4)$$

$$a_3 = (1, 2, 3, 4)$$

$$a_4 = (1, 4, 3, 2)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_2 = \{3, 8, 16, 33\}$  (length 4)

The induced group has order 4 and is generated by:

$$g_1 = (1, 2)(3, 4)$$

$$g_2 = (1, 4, 2, 3)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 2)(3, 4)$$

$$a_3 = (1, 4, 2, 3)$$

$$a_4 = (1, 3, 2, 4)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_3 = \{4, 6, 18, 32\}$  (length 4)

The induced group has order 4 and is generated by:

$$g_1 = (1, 2)(3, 4)$$

$$g_2 = (1, 3, 2, 4)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 2)(3, 4)$$

$$a_3 = (1, 3, 2, 4)$$

$$a_4 = (1, 4, 2, 3)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_4 = \{5, 21, 30, 37\}$  (length 4)

The induced group has order 4 and is generated by:

$$g_1 = (1, 4)(2, 3)$$

$$g_2 = (1, 3, 4, 2)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 4)(2, 3)$$

$$a_3 = (1, 3, 4, 2)$$

$$a_4 = (1, 2, 4, 3)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_5 = \{7, 10, 28, 36\}$  (length 4)

The induced group has order 4 and is generated by:

$$g_1 = (1, 4)(2, 3)$$

$$g_2 = (1, 2, 4, 3)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 4)(2, 3)$$

$$a_3 = (1, 2, 4, 3)$$

$$a_4 = (1, 3, 4, 2)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_6 = \{9, 17, 20, 26\}$  (length 4)

The induced group has order 4 and is generated by:

$$g_1 = (1, 2)(3, 4)$$

$$g_2 = (1, 3, 2, 4)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 2)(3, 4)$$

$$a_3 = (1, 3, 2, 4)$$

$$a_4 = (1, 4, 2, 3)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_7 = \{13, 14, 24, 35\}$  (length 4)

The induced group has order 4 and is generated by:

$$g_1 = (1, 2)(3, 4)$$

$$g_2 = (1, 4, 2, 3)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 2)(3, 4)$$

$$a_3 = (1, 4, 2, 3)$$

$$a_4 = (1, 3, 2, 4)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_8 = \{15, 23\}$  (length 2)

The induced group has order 2 and is generated by:

$$g_1 = \text{id}$$

$$g_2 = (1, 2)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = \text{id}$$

Kernel has order 2 and is generated by:

$$b_1 = \begin{pmatrix} 12 & 23 & 30 & 27 & 13 \\ 15 & 27 & 8 & 9 & 25 \\ 30 & 6 & 27 & 24 & 2 \\ 25 & 2 & 25 & 23 & 35 \\ 32 & 24 & 9 & 4 & 23 \end{pmatrix}$$

The kernel has 26050 orbits on the quadric.

The orbit length are  $[2^{26010}, 1^{40}]$

Induced action on orbit  $O_0 = \{1, 16769\}$  (length 2)

The induced group has order 2 and is generated by:

$$g_1 = (1, 2)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 2)$$

Kernel has order 1 and is generated by:

Induced action on orbit  $O_9 = \{27, 29, 34, 38\}$  (length 4)

The induced group has order 4 and is generated by:

$$g_1 = (1, 3)(2, 4)$$

$$g_2 = (1, 2, 3, 4)$$

group order is small, so we list all elements  $a_1 = \text{id}$

$$a_2 = (1, 3)(2, 4)$$

$$a_3 = (1, 2, 3, 4)$$

$$a_4 = (1, 4, 3, 2)$$

Kernel has order 1 and is generated by: