

1 BLT set 4 over GF(43)

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

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

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

$$P_3 = (0, 1, 21, 42, 21)$$

$$P_4 = (0, 1, 16, 21, 32)$$

$$P_5 = (0, 1, 31, 6, 2)$$

$$P_6 = (0, 1, 11, 15, 5)$$

$$P_7 = (1, 17, 24, 6, 25)$$

$$P_8 = (1, 1, 13, 19, 40)$$

$$P_9 = (1, 34, 30, 10, 14)$$

$$P_{10} = (1, 33, 7, 21, 34)$$

$$P_{11} = (1, 42, 33, 6, 34)$$

$$P_{12} = (0, 1, 9, 12, 10)$$

$$P_{13} = (1, 2, 20, 23, 30)$$

$$P_{14} = (1, 7, 22, 26, 42)$$

$$P_{15} = (1, 2, 34, 17, 1)$$

$$P_{16} = (1, 26, 28, 34, 38)$$

$$P_{17} = (1, 26, 42, 23, 31)$$

$$P_{18} = (1, 11, 9, 1, 29)$$

$$P_{19} = (1, 16, 6, 32, 1)$$

$$P_{20} = (1, 30, 8, 27, 7)$$

$$P_{21} = (1, 31, 21, 18, 2)$$

$$P_{22} = (1, 7, 26, 32, 1)$$

$$P_{23} = (1, 28, 28, 5, 15)$$

$$P_{24} = (1, 20, 19, 39, 20)$$

$$P_{25} = (1, 6, 13, 23, 19)$$

$$P_{26} = (1, 8, 34, 11, 26)$$

$$P_{27} = (1, 12, 19, 17, 27)$$

$$P_{28} = (1, 41, 24, 27, 32)$$

$$P_{29} = (1, 9, 9, 4, 1)$$

$$P_{30} = (1, 19, 30, 14, 36)$$

$$P_{31} = (1, 40, 15, 22, 2)$$

$$P_{32} = (1, 4, 17, 14, 35)$$

$$P_{33} = (1, 7, 22, 20, 3)$$

$$P_{34} = (0, 1, 1, 26, 38)$$

$$P_{35} = (1, 38, 35, 38, 34)$$

$$P_{36} = (1, 7, 37, 8, 32)$$

$$P_{37} = (1, 29, 34, 8, 11)$$

$$P_{38} = (1, 11, 1, 27, 33)$$

$$P_{39} = (1, 21, 15, 8, 25)$$

$$P_{40} = (1, 17, 9, 10, 19)$$

$$P_{41} = (1, 35, 21, 24, 41)$$

$$P_{42} = (1, 35, 23, 29, 33)$$

$$P_{43} = (1, 17, 36, 36, 20)$$

$$P_{44} = (1, 31, 10, 3, 11)$$

Stabilizer of order 4 is generated by:

$$g_1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$g_2 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

The induced group has order 4 and is generated by:

$$g_1 = (2, 4)(5, 34)(6, 12)(7, 24)(8, 9)(10, 43)(11, 44)(13, 42)(14, 41)(15, 40)(16, 39)(17, 38)(18, 37)(19, 36)(20, 35)(21, 33)(22, 32)(23, 31)(25, 30)(26, 29)(27, 28)$$

$$g_2 = (1, 3)(2, 29)(4, 26)(5, 18)(6, 9)(7, 30)(8, 12)(10, 11)(13, 21)(14, 31)(15, 20)(16, 17)(19, 27)(23, 41)(24, 25)(28, 36)(33, 42)(34, 37)(35, 40)(38, 39)(43, 44)$$

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

$$a_2 = (2, 4)(5, 34)(6, 12)(7, 24)(8, 9)(10, 43)(11, 44)(13, 42)(14, 41)(15, 40)(16, 39)(17, 38)(18, 37)(19, 36)(20, 35)(21, 33)(22, 32)(23, 31)(25, 30)(26, 29)(27, 28)$$

$$a_3 = (1, 3)(2, 29)(4, 26)(5, 18)(6, 9)(7, 30)(8, 12)(10, 11)(13, 21)(14, 31)(15, 20)(16, 17)(19, 27)(23, 41)(24, 25)(28, 36)(33, 42)(34, 37)(35, 40)(38, 39)(43, 44)$$

$$a_4 = (1, 3)(2, 26)(4, 29)(5, 37)(6, 8)(7, 25)(9, 12)(10, 44)(11, 43)(13, 33)(14, 23)(15, 35)(16, 38)(17, 39)(18, 34)(19, 28)(20, 40)(21, 42)(22, 32)(24, 30)(27, 36)(31, 41)$$

and now the elements themselves: $a_1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

There are 12 orbits on the BLT set.

The orbit length are $[4^{10}, 2^2]$

The orbits are:

$$O_0 = \{1, 3\} \text{ (length 2)}$$

$$O_1 = \{2, 4, 26, 29\} \text{ (length 4)}$$

$$O_2 = \{5, 18, 34, 37\} \text{ (length 4)}$$

$$O_3 = \{6, 8, 9, 12\} \text{ (length 4)}$$

$$O_4 = \{7, 24, 25, 30\} \text{ (length 4)}$$

$$O_5 = \{10, 11, 43, 44\} \text{ (length 4)}$$

$$O_6 = \{13, 21, 33, 42\} \text{ (length 4)}$$

$$O_7 = \{14, 23, 31, 41\} \text{ (length 4)}$$

$$O_8 = \{15, 20, 35, 40\} \text{ (length 4)}$$

$$O_9 = \{16, 17, 38, 39\} \text{ (length 4)}$$

$$O_{10} = \{19, 27, 28, 36\} \text{ (length 4)}$$

$$O_{11} = \{22, 32\} \text{ (length 2)}$$

The actions induced on the orbits are:

Induced action on orbit $O_0 = \{1, 3\}$ (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 $a_1 = \text{id}$

$$a_2 = \text{id}$$

and now the elements themselves: $a_1 =$

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

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

Kernel has order 2 and is generated by:

$$b_1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

The kernel has 40723 orbits on the quadric.

The orbit length are $[2^{40677}, 1^{46}]$

Induced action on orbit $O_1 = \{2, 4, 26, 29\}$ (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 $a_1 = \text{id}$

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

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

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

and now the elements themselves: $a_1 =$

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

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_2 = \{5, 18, 34, 37\}$ (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 $a_1 = \text{id}$

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

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

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

and now the elements themselves: $a_1 =$

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

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_3 = \{6, 8, 9, 12\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

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

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

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

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

and now the elements themselves: $a_1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_4 = \{7, 24, 25, 30\}$ (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 $a_1 = \text{id}$

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

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

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

and now the elements themselves: $a_1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_5 = \{10, 11, 43, 44\}$ (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 $a_1 = \text{id}$

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

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

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

and now the elements themselves: $a_1 =$

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

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_6 = \{13, 21, 33, 42\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

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

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

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

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

and now the elements themselves: $a_1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_7 = \{14, 23, 31, 41\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

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

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

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

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

and now the elements themselves: $a_1 =$

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

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_8 = \{15, 20, 35, 40\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

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

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

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

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

and now the elements themselves: $a_1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_9 = \{16, 17, 38, 39\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

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

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

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

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

and now the elements themselves: $a_1 =$

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

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_{10} = \{19, 27, 28, 36\}$ (length 4)

The induced group has order 4 and is generated by:

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

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

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

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

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

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

and now the elements themselves: $a_1 =$

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

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 36 & 25 & 7 & 25 \\ 39 & 11 & 36 & 42 & 25 \\ 7 & 25 & 25 & 19 & 3 \\ 33 & 42 & 7 & 20 & 19 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_{11} = \{22, 32\}$ (length 2)

The induced group has order 2 and is generated by:

$$g_1 = (1, 2)$$

$$g_2 = \text{id}$$

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

$$a_2 = (1, 2)$$

and now the elements themselves: $a_1 =$

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

$$a_2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 42 & 0 & 0 & 0 \\ 0 & 8 & 42 & 39 & 41 \\ 0 & 41 & 0 & 1 & 0 \\ 0 & 39 & 0 & 0 & 1 \end{pmatrix}$$

Kernel has order 2 and is generated by:

$$b_1 = \begin{pmatrix} 18 & 35 & 0 & 23 & 14 \\ 0 & 7 & 18 & 36 & 18 \\ 39 & 7 & 7 & 27 & 39 \\ 7 & 39 & 18 & 5 & 39 \\ 33 & 27 & 36 & 35 & 5 \end{pmatrix}$$

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

$$b_3 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

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

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

The kernel has 40723 orbits on the quadric.

The orbit length are $[2^{40677}, 1^{46}]$