1 BLT set 5 over GF(43)

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

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

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

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

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

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

$P_6 = (0, 1, 17, 41, 30)$

$P_7 = (1, 28, 33, 8, 8)$

$P_8 = (1, 25, 6, 30, 5)$

$P_9 = (1, 28, 28, 5, 15)$

$P_{10} = (1, 28, 8, 35, 12)$

$P_{11} = (1, 10, 36, 26, 1)$

$P_{12} = (1, 42, 8, 15, 32)$

$P_{13} = (1, 25, 17, 40, 13)$

$P_{14} = (1, 5, 30, 22, 42)$

$P_{15} = (1, 5, 3, 37, 17)$

$P_{16} = (0, 1, 40, 20, 41)$

$P_{17} = (0, 1, 1, 19, 9)$

$P_{18} = (1, 39, 22, 23, 15)$

$P_{19} = (1, 4, 21, 3, 29)$

$P_{20} = (1, 16, 15, 34, 22)$

$P_{21} = (1, 42, 19, 13, 8)$

$P_{22} = (1, 12, 19, 11, 30)$

$P_{23} = (1, 25, 6, 32, 2)$

$P_{24} = (1, 12, 32, 32, 35)$

$P_{25} = (1, 20, 26, 10, 21)$

$P_{26} = (1, 24, 13, 42, 12)$

$P_{27} = (1, 37, 34, 28, 18)$

$P_{28} = (1, 41, 1, 29, 3)$

$P_{29} = (1, 3, 12, 3, 2)$

$P_{30} = (1, 13, 6, 14, 22)$

$P_{31} = (1, 31, 36, 38, 17)$

$P_{32} = (1, 32, 27, 21, 10)$

$P_{33} = (1, 18, 7, 32, 35)$

$P_{34} = (1, 4, 15, 6, 40)$

$P_{35} = (1, 36, 38, 35, 26)$

$P_{36} = (1, 13, 4, 18, 9)$

$P_{37} = (1, 37, 18, 32, 2)$

$P_{38} = (1, 3, 12, 30, 26)$

$P_{39} = (1, 18, 2, 12, 22)$

$P_{40} = (1, 2, 28, 36, 2)$

$P_{41} = (1, 3, 34, 19, 24)$

$P_{42} = (1, 8, 7, 11, 30)$

$P_{43} = (1, 33, 42, 8, 4)$

$P_{44} = (1, 17, 1, 28, 27)$

Stabilizer of order 4 is generated by:

$$g_1 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$g_2 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

The induced group has order 4 and is generated by:

g_1 =(1, 5)(2, 16)(3, 4)(6, 17)(7, 33)(8, 35)(9, 24)(10, 18)(11, 36)(12, 22)(13, 23)(14, 38)(15, 40)(19, 31)(20, 26)(21, 42)(25, 32)(27, 37)(28, 44)(29, 41)(30, 34)(39, 43)

g_2 =(1, 28, 5, 44)(2, 23, 16, 13)(3, 9, 4, 24)(6, 19, 17, 31)(7, 15, 33, 40)(8, 27, 35, 37)(10, 36, 18, 11)(12, 26, 22, 20)(14, 43, 38, 39)(21, 25, 42, 32)(29, 30, 41, 34)

group order is small, so we list all elements a_1 =id

a_2 =(1, 5)(2, 16)(3, 4)(6, 17)(7, 33)(8, 35)(9, 24)(10, 18)(11, 36)(12, 22)(13, 23)(14, 38)(15, 40)(19, 31)(20, 26)(21, 42)(25, 32)(27, 37)(28, 44)(29, 41)(30, 34)(39, 43)

a_3 =(1, 28, 5, 44)(2, 23, 16, 13)(3, 9, 4, 24)(6, 19, 17, 31)(7, 15, 33, 40)(8, 27, 35, 37)(10, 36, 18, 11)(12, 26, 22, 20)(14, 43, 38, 39)(21, 25, 42, 32)(29, 30, 41, 34)

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

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

There are 11 orbits on the BLT set.

The orbit length are $[4^{11}]$

The orbits are:

$O_0 = \{1, 5, 28, 44\}$ (length 4)

$O_1 = \{2, 13, 16, 23\}$ (length 4)

$O_2 = \{3, 4, 9, 24\}$ (length 4)

$O_3 = \{6, 17, 19, 31\}$ (length 4)

$O_4 = \{7, 15, 33, 40\}$ (length 4)

$O_5 = \{8, 27, 35, 37\}$ (length 4)

$O_6 = \{10, 11, 18, 36\}$ (length 4)

$O_7 = \{12, 20, 22, 26\}$ (length 4)

$O_8 = \{14, 38, 39, 43\}$ (length 4)

$O_9 = \{21, 25, 32, 42\}$ (length 4)

$O_{10} = \{29, 30, 34, 41\}$ (length 4)

The actions induced on the orbits are:

Induced action on orbit $O_0 = \{1, 5, 28, 44\}$ (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 =id

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

a_3 =(1, 3, 2, 4)

a_4 =(1, 4, 2, 3)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_1 = \{2, 13, 16, 23\}$ (length 4)

The induced group has order 4 and is generated by:

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

g_2 =(1, 4, 3, 2)

group order is small, so we list all elements a_1 =id

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

a_3 =(1, 4, 3, 2)

a_4 =(1, 2, 3, 4)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_2 = \{3, 4, 9, 24\}$ (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 =id

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

a_3 =(1, 3, 2, 4)

a_4 =(1, 4, 2, 3)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_3 = \{6, 17, 19, 31\}$ (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 =id

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

a_3 =(1, 3, 2, 4)

a_4 =(1, 4, 2, 3)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_4 = \{7, 15, 33, 40\}$ (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 =id

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

a_3 =(1, 2, 3, 4)

a_4 =(1, 4, 3, 2)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_5 = \{8, 27, 35, 37\}$ (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 =id

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

a_3 =(1, 2, 3, 4)

a_4 =(1, 4, 3, 2)

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

$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$

$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$

$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$

Kernel has order 1 and is generated by:

Induced action on orbit $O_6 = \{10, 11, 18, 36\}$ (length 4)

The induced group has order 4 and is generated by:

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

g_2 =(1, 4, 3, 2)

group order is small, so we list all elements a_1 =id

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

a_3 =(1, 4, 3, 2)

a_4 =(1, 2, 3, 4)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_7 = \{12, 20, 22, 26\}$ (length 4)

The induced group has order 4 and is generated by:

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

g_2 =(1, 4, 3, 2)

group order is small, so we list all elements a_1 =id

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

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

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

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_8 = \{14, 38, 39, 43\}$ (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 =id

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

a_3 =(1, 4, 2, 3)

a_4 =(1, 3, 2, 4)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_9 = \{21, 25, 32, 42\}$ (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 =id

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

a_3 =(1, 2, 4, 3)

a_4 =(1, 3, 4, 2)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by:

Induced action on orbit $O_{10} = \{29, 30, 34, 41\}$ (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 =id

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

a_3 =(1, 2, 4, 3)

a_4 =(1, 3, 4, 2)

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

$$a_2 = \begin{pmatrix} 42 & 0 & 0 & 0 & 0 \\ 0 & 20 & 18 & 34 & 40 \\ 0 & 22 & 20 & 10 & 42 \\ 0 & 42 & 40 & 23 & 41 \\ 0 & 10 & 34 & 17 & 23 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} 12 & 1 & 13 & 33 & 7 \\ 28 & 30 & 28 & 38 & 41 \\ 22 & 34 & 3 & 16 & 1 \\ 25 & 28 & 25 & 37 & 13 \\ 38 & 20 & 10 & 41 & 5 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 31 & 42 & 30 & 10 & 36 \\ 15 & 40 & 15 & 33 & 18 \\ 21 & 9 & 13 & 23 & 15 \\ 18 & 42 & 2 & 38 & 30 \\ 5 & 27 & 5 & 2 & 6 \end{pmatrix}$$

Kernel has order 1 and is generated by: