Planar Groups

August 29, 2025

Contents

1 Planar Groups

1.1 Group 2

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1

matrix	det	except

matrix	conds

1.2 Group 3

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	x_0x_1	$(x_0+1)x_1+x_0+1$	$(x_0-1)x_1-x_0+1$

matrix	det	except
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	x_0x_1	$-1 \quad -1$ $-1 \quad n_1$ $-1 \quad 1$ $1 \quad 1$ $1 \quad n_1$ $1 \quad -1$ $n_1 \quad -1$ $n_1 \quad 1$

matrix	conds
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	[]

1.3 Group 4

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & \frac{1}{2} \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & -\frac{1}{2} \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_1 & 0 \\ 0 & x_0 \end{pmatrix}$	$x_0 x_1$	$(x_0+1)x_1 + x_0 + 1$	$(x_0-1)x_1 - x_0 + 1$

matrix	det	except
$\begin{pmatrix} x_1 & 0 \\ 0 & x_0 \end{pmatrix}$	$x_0 x_1$	$\begin{matrix} -1 & -1 \\ -1 & n_1 \\ -1 & 1 \\ 1 & 1 \\ 1 & n_1 \\ 1 & -1 \\ n_1 & -1 \\ n_1 & 1 \end{matrix}$

matrix	conds
$\begin{pmatrix} x_1 & 0 \\ 0 & x_0 \end{pmatrix}$	$[-2\,a_0, \frac{1}{2}\,x_0 - \frac{1}{2}]$

1.4 Group 5

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 - 2\,x_1 & 0 \\ x_1 & x_0 \end{pmatrix}$	$(x_0 - 2\,x_1)x_0$	$x_0^2 - 2\,(x_0 + 1)x_1 + 2\,x_0 + 1$	$x_0^2 - 2\,(x_0 - 1)x_1 - 2\,x_0 + 1$

matrix	det	except
$\begin{pmatrix} x_0 - 2\,x_1 & 0 \\ x_1 & x_0 \end{pmatrix}$	$(x_0 - 2\,x_1)x_0$	$2\,t_0 + 1 \quad t_0$ $-1 \quad -1$ $-1 \quad n_1$ $-1 \quad 0$ $1 \quad n_1$ $1 \quad 0$ $1 \quad 1$ $2\,t_0 - 1 \quad t_0$

matrix	conds
$\begin{pmatrix} x_0 - 2\,x_1 & 0 \\ x_1 & x_0 \end{pmatrix}$	[]

1.5 Group 6

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	x_0x_1	$(x_0+1)x_1+x_0+1$	$(x_0-1)x_1-x_0+1$
$\begin{pmatrix} 0 & x_0 \\ x_1 & 0 \end{pmatrix}$	$-x_0x_1$	$-x_0x_1+1$	$-x_0x_1+1$

matrix	det	except
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	x_0x_1	$-1 \quad -1$ $-1 \quad n_1$ $-1 \quad 1$ $1 \quad 1$ $1 \quad n_1$ $1 \quad -1$ $n_1 \quad -1$ $n_1 \quad 1$
$\begin{pmatrix} 0 & x_0 \\ x_1 & 0 \end{pmatrix}$	$-x_0x_1$	$-1 \quad -1$ $-1 \quad 1$ $1 \quad -1$ $1 \quad 1$

matrix	conds
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ x_1 & 0 \end{pmatrix}$	[]

1.6 Group 7

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & \frac{1}{2} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & \frac{1}{2} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & -\frac{1}{2} \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_1 & 0 \\ 0 & x_0 \end{pmatrix}$	$x_0 x_1$	$(x_0+1)x_1 + x_0 + 1$	$(x_0-1)x_1 - x_0 + 1$

matrix	det	except
$\begin{pmatrix} x_1 & 0 \\ 0 & x_0 \end{pmatrix}$	$x_0 x_1$	$\begin{matrix} -1 & -1 \\ -1 & n_1 \\ -1 & 1 \\ 1 & 1 \\ 1 & n_1 \\ 1 & -1 \\ n_1 & -1 \\ n_1 & 1 \end{matrix}$

matrix	conds
$\begin{pmatrix} x_1 & 0 \\ 0 & x_0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -2\,a_0 - \frac{1}{2}\,x_1 + \frac{1}{2}, \frac{1}{2}\,x_1 - \frac{1}{2}, -2\,a_1\right]$

1.7 Group 8

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & \frac{1}{2} \\ 0 & 1 & \frac{1}{2} \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & \frac{1}{2} \\ 0 & 1 & -\frac{1}{2} \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & -\frac{1}{2} \\ 0 & -1 & -\frac{1}{2} \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	$x_0 x_1$	$(x_0+1)x_1 + x_0 + 1$	$(x_0-1)x_1 - x_0 + 1$
$\begin{pmatrix} 0 & x_1 \\ x_0 & 0 \end{pmatrix}$	$-x_0 x_1$	$-x_0 x_1 + 1$	$-x_0 x_1 + 1$

matrix	det	except
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	$x_0 x_1$	$\begin{matrix} -1 & -1 \\ -1 & n_1 \\ -1 & 1 \\ 1 & 1 \\ 1 & n_1 \\ 1 & -1 \\ n_1 & -1 \\ n_1 & 1 \end{matrix}$
$\begin{pmatrix} 0 & x_1 \\ x_0 & 0 \end{pmatrix}$	$-x_0 x_1$	$\begin{matrix} -1 & -1 \\ -1 & 1 \\ 1 & -1 \\ 1 & 1 \end{matrix}$

matrix	conds
$\begin{pmatrix} x_0 & 0 \\ 0 & x_1 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -2\,a_0 - \frac{1}{2}\,x_0 + \frac{1}{2}, \frac{1}{2}\,x_1 - \frac{1}{2}, \frac{1}{2}\,x_0 - \frac{1}{2}, -2\,a_1 + \frac{1}{2}\,x_1 - \frac{1}{2}\right]$
$\begin{pmatrix} 0 & x_1 \\ x_0 & 0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, \frac{1}{2}\,x_1 - \frac{1}{2}, -2\,a_1 - \frac{1}{2}\,x_0 - \frac{1}{2}, -2\,a_0 + \frac{1}{2}\,x_1 + \frac{1}{2}, \frac{1}{2}\,x_0 - \frac{1}{2}\right]$

1.8 Group 9

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ -1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 - 2\,x_1 & 0 \\ x_1 & x_0 \end{pmatrix}$	$(x_0 - 2\,x_1)x_0$	$x_0^2 - 2\,(x_0 + 1)x_1 + 2\,x_0 + 1$	$x_0^2 - 2\,(x_0 - 1)x_1 - 2\,x_0 + 1$
$\begin{pmatrix} -x_0 & -2\,x_0 \\ x_1 & x_0 \end{pmatrix}$	$-x_0^2 + 2\,x_0x_1$	$-x_0^2 + 2\,x_0x_1 + 1$	$-x_0^2 + 2\,x_0x_1 + 1$

matrix	det	except
$\begin{pmatrix} x_0 - 2\,x_1 & 0 \\ x_1 & x_0 \end{pmatrix}$	$(x_0 - 2\,x_1)x_0$	$2\,t_0 + 1 \quad t_0$ $-1 \quad -1$ $-1 \quad n_1$ $-1 \quad 0$ $1 \quad n_1$ $1 \quad 0$ $1 \quad 1$ $2\,t_0 - 1 \quad t_0$
$\begin{pmatrix} -x_0 & -2\,x_0 \\ x_1 & x_0 \end{pmatrix}$	$-x_0^2 + 2\,x_0x_1$	$-1 \quad -1$ $-1 \quad 0$ $1 \quad 0$ $1 \quad 1$

matrix	conds
$\begin{pmatrix} x_0 - 2\,x_1 & 0 \\ x_1 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & -2\,x_0 \\ x_1 & x_0 \end{pmatrix}$	[]

1.9 Group 10

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_1 & -x_0 \\ x_0 & x_1 \end{pmatrix}$	$x_0^2 + x_1^2$	$x_0^2 + x_1^2 + 2\,x_1 + 1$	$x_0^2 + x_1^2 - 2\,x_1 + 1$
$\begin{pmatrix} -x_0 & x_1 \\ x_1 & x_0 \end{pmatrix}$	$-x_0^2 - x_1^2$	$-x_0^2 - x_1^2 + 1$	$-x_0^2 - x_1^2 + 1$

matrix	det	except
$\begin{pmatrix} x_1 & -x_0 \\ x_0 & x_1 \end{pmatrix}$	$x_0^2 + x_1^2$	$\begin{matrix} -1 & 0 \\ 0 & -1 \\ 0 & 1 \\ 1 & 0 \end{matrix}$
$\begin{pmatrix} -x_0 & x_1 \\ x_1 & x_0 \end{pmatrix}$	$-x_0^2 - x_1^2$	$\begin{matrix} -1 & 0 \\ 0 & -1 \\ 0 & 1 \\ 1 & 0 \end{matrix}$

matrix	conds
$\begin{pmatrix} x_1 & -x_0 \\ x_0 & x_1 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & x_1 \\ x_1 & x_0 \end{pmatrix}$	[]

1.10 Group 11

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \left(\right.$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	$x_0^2 + 2\,x_0 + 1$	$x_0^2 - 2\,x_0 + 1$
$\begin{pmatrix} -x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	$2\,x_0^2$	$2\,x_0^2 + 2\,x_0 + 1$	$2\,x_0^2 - 2\,x_0 + 1$
$\begin{pmatrix} -x_0 & -x_0 \\ -x_0 & x_0 \end{pmatrix}$	$-2\,x_0^2$	$-2\,x_0^2 + 1$	$-2\,x_0^2 + 1$
$\begin{pmatrix} 0 & x_0 \\ -x_0 & 0 \end{pmatrix}$	x_0^2	$x_0^2 + 1$	$x_0^2 + 1$
$\begin{pmatrix} x_0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	$2\,x_0^2$	$2\,x_0^2 + 2\,x_0 + 1$	$2\,x_0^2 - 2\,x_0 + 1$
$\begin{pmatrix} -x_0 & x_0 \\ x_0 & x_0 \end{pmatrix}$	$-2\,x_0^2$	$-2\,x_0^2 + 1$	$-2\,x_0^2 + 1$

matrix	det	except
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} -x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	$2\,x_0^2$	[]
$\begin{pmatrix} -x_0 & -x_0 \\ -x_0 & x_0 \end{pmatrix}$	$-2\,x_0^2$	[]
$\begin{pmatrix} 0 & x_0 \\ -x_0 & 0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} x_0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	$2\,x_0^2$	[]
$\begin{pmatrix} -x_0 & x_0 \\ x_0 & x_0 \end{pmatrix}$	$-2\,x_0^2$	[]

matrix	conds
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	[]
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & -x_0 \\ -x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ -x_0 & 0 \end{pmatrix}$	[]
$\begin{pmatrix} x_0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & x_0 \\ x_0 & x_0 \end{pmatrix}$	[]

1.11 Group 12

Generators of group:

$$\left[\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & \frac{1}{2} \\ 0 & 1 & \frac{1}{2} \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & \frac{1}{2} \\ 0 & 1 & -\frac{1}{2} \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & -\frac{1}{2} \\ 0 & -1 & -\frac{1}{2} \\ 0 & 0 & 1 \end{pmatrix}$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	$x_0^2 + 2\,x_0 + 1$	$x_0^2 - 2\,x_0 + 1$
$\begin{pmatrix} -x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	$2\,x_0^2$	$2\,x_0^2 + 2\,x_0 + 1$	$2\,x_0^2 - 2\,x_0 + 1$
$\begin{pmatrix} -x_0 & -x_0 \\ -x_0 & x_0 \end{pmatrix}$	$-2\,x_0^2$	$-2\,x_0^2 + 1$	$-2\,x_0^2 + 1$
$\begin{pmatrix} 0 & x_0 \\ -x_0 & 0 \end{pmatrix}$	x_0^2	$x_0^2 + 1$	$x_0^2 + 1$
$\begin{pmatrix} x_0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	$2\,x_0^2$	$2\,x_0^2 + 2\,x_0 + 1$	$2\,x_0^2 - 2\,x_0 + 1$
$\begin{pmatrix} -x_0 & x_0 \\ x_0 & x_0 \end{pmatrix}$	$-2\,x_0^2$	$-2\,x_0^2 + 1$	$-2\,x_0^2 + 1$

matrix	det	except
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} -x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	$2\,x_0^2$	[]
$\begin{pmatrix} -x_0 & -x_0 \\ -x_0 & x_0 \end{pmatrix}$	$-2\,x_0^2$	[]
$\begin{pmatrix} 0 & x_0 \\ -x_0 & 0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} x_0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	$2\,x_0^2$	[]
$\begin{pmatrix} -x_0 & x_0 \\ x_0 & x_0 \end{pmatrix}$	$-2\,x_0^2$	[]

matrix	conds
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -a_0 - a_1, a_0 - a_1, -2\,a_0 - \frac{1}{2}\,x_0 + \frac{1}{2}, \frac{1}{2}\,x_0 - \frac{1}{2}, -a_0 + a_1, -a_0 - a_1, \frac{1}{2}\,x_0 -\right.$
$\begin{pmatrix} -x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -a_0 + a_1, -a_0 - a_1, -2\,a_0 + \frac{1}{2}\,x_0 + \frac{1}{2}, \frac{1}{2}\,x_0 - \frac{1}{2}, -a_0 - a_1, a_0 - a_1, -\frac{1}{2}\,x_0\right.$
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -a_0 + a_1, -a_0 - a_1, \frac{1}{2}\,x_0 - \frac{1}{2}, -2\,a_1 - \frac{1}{2}\,x_0 - \frac{1}{2}, -a_0 - a_1, a_0 - a_1, -2\,a_0\right.$
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -a_0 - a_1, a_0 - a_1, -a_0 - a_1 - x_0 - \frac{1}{2}, -a_0 - a_1 + \frac{1}{2}, -a_0 + a_1, -a_0 - a\right.$
$\begin{pmatrix} -x_0 & -x_0 \\ -x_0 & x_0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -a_0 + a_1, -a_0 - a_1, -a_0 - a_1 - \frac{1}{2}, -a_0 - a_1 + x_0 + \frac{1}{2}, -a_0 - a_1, a_0 - a\right.$
$\begin{pmatrix} 0 & x_0 \\ -x_0 & 0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -a_0 - a_1, a_0 - a_1, \frac{1}{2}\,x_0 - \frac{1}{2}, -2\,a_1 + \frac{1}{2}\,x_0 - \frac{1}{2}, -a_0 + a_1, -a_0 - a_1, -2\,a_0\right.$
$\begin{pmatrix} x_0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -a_0 - a_1, a_0 - a_1, -a_0 + a_1 + \frac{1}{2}, a_0 - a_1 + x_0 + \frac{1}{2}, -a_0 + a_1, -a_0 - a_1,\right.$
$\begin{pmatrix} -x_0 & x_0 \\ x_0 & x_0 \end{pmatrix}$	$\left[-2\,a_0, -2\,a_1, -a_0 + a_1, -a_0 - a_1, -a_0 + a_1 + x_0 + \frac{1}{2}, a_0 - a_1 + \frac{1}{2}, -a_0 - a_1, a_0 - a_1,\right.$

1.12 Group 13

Generators of group:

$$\left[\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0+x_1 & -x_0 \\ & x_0 \quad x_1 \end{pmatrix}$	$x_0^2+(x_0+x_1)x_1$	$x_0^2+(x_0+2)x_1+x_1^2+x_0+1$	$x_0^2+(x_0-2)x_1+x_1^2-x_0+$
$\begin{pmatrix} -x_1 & x_0+x_1 \\ x_0 & x_1 \end{pmatrix}$	$-(x_0+x_1)x_0-x_1^2$	$-x_0^2-x_0x_1-x_1^2+1$	$-x_0^2-x_0x_1-x_1^2+1$

matrix	det	except
$\begin{pmatrix} x_0+x_1 & -x_0 \\ & x_0 \quad x_1 \end{pmatrix}$	$x_0^2+(x_0+x_1)x_1$	$\begin{matrix} -1 & 0 \\ -1 & 1 \\ 0 & -1 \\ 0 & 1 \\ 1 & -1 \\ 1 & 0 \end{matrix}$
$\begin{pmatrix} -x_1 & x_0+x_1 \\ x_0 & x_1 \end{pmatrix}$	$-(x_0+x_1)x_0-x_1^2$	$\begin{matrix} -1 & 0 \\ -1 & 1 \\ 0 & -1 \\ 0 & 1 \\ 1 & -1 \\ 1 & 0 \end{matrix}$

matrix	conds
$\begin{pmatrix} x_0+x_1 & -x_0 \\ & x_0 \quad x_1 \end{pmatrix}$	[]
$\begin{pmatrix} -x_1 & x_0+x_1 \\ x_0 & x_1 \end{pmatrix}$	[]

1.13 Group 14

Generators of group:

$$\left[\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	x_0^2	$x_0^2 + x_0 + 1$	$x_0^2 - x_0 + 1$
$\begin{pmatrix} x_0 & 0 \\ x_0 & -x_0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	x_0^2	$x_0^2 + x_0 + 1$	$x_0^2 - x_0 + 1$
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	$x_0^2 + 2\,x_0 + 1$	$x_0^2 - 2\,x_0 + 1$
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$

matrix	det	except
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} x_0 & 0 \\ x_0 & -x_0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	-1 1

matrix	conds
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	[]
$\begin{pmatrix} x_0 & 0 \\ x_0 & -x_0 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	[]

1.14 Group 15

Generators of group:

$$\left[\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	x_0^2	$x_0^2 + x_0 + 1$	$x_0^2 - x_0 + 1$
$\begin{pmatrix} x_0 & 0 \\ x_0 & -x_0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	x_0^2	$x_0^2 + x_0 + 1$	$x_0^2 - x_0 + 1$
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	$x_0^2 + 2\,x_0 + 1$	$x_0^2 - 2\,x_0 + 1$
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	$-x_0^2 + 1$	$-x_0^2 + 1$

matrix	det	except
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} x_0 & 0 \\ x_0 & -x_0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	-1 1

matrix	conds
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	[]
$\begin{pmatrix} x_0 & 0 \\ x_0 & -x_0 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	[]

1.15 Group 16

Generators of group:

$$\left[\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} x_0+x_1 & -x_0 \\ x_0 & x_1 \end{pmatrix}$	$x_0^2+(x_0+x_1)x_1$	$x_0^2+(x_0+2)x_1+x_1^2+x_0+1$	$x_0^2+(x_0-2)x_1+x_1^2-x_0+$
$\begin{pmatrix} -x_1 & x_0+x_1 \\ x_0 & x_1 \end{pmatrix}$	$-(x_0+x_1)x_0-x_1^2$	$-x_0^2-x_0x_1-x_1^2+1$	$-x_0^2-x_0x_1-x_1^2+1$

matrix	det	except
$\begin{pmatrix} x_0+x_1 & -x_0 \\ x_0 & x_1 \end{pmatrix}$	$x_0^2+(x_0+x_1)x_1$	$\begin{matrix} -1 & 0 \\ -1 & 1 \\ 0 & -1 \\ 0 & 1 \\ 1 & -1 \\ 1 & 0 \end{matrix}$
$\begin{pmatrix} -x_1 & x_0+x_1 \\ x_0 & x_1 \end{pmatrix}$	$-(x_0+x_1)x_0-x_1^2$	$\begin{matrix} -1 & 0 \\ -1 & 1 \\ 0 & -1 \\ 0 & 1 \\ 1 & -1 \\ 1 & 0 \end{matrix}$

matrix	conds
$\begin{pmatrix} x_0+x_1 & -x_0 \\ x_0 & x_1 \end{pmatrix}$	[]
$\begin{pmatrix} -x_1 & x_0+x_1 \\ x_0 & x_1 \end{pmatrix}$	[]

1.16 Group 17

Generators of group:

$$\left[\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}\right]$$

SNoT

$$\left[\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix},$$

matrix	det	eigenvalue != 1	eigenvalue != -1
$\begin{pmatrix} -x_0 & 0 \\ -x_0 & x_0 \end{pmatrix}$	$-x_0^2$	$-x_0^2+1$	$-x_0^2+1$
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	x_0^2	$x_0^2+x_0+1$	$x_0^2-x_0+1$
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	x_0^2	$x_0^2+x_0+1$	$x_0^2-x_0+1$
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	$x_0^2+2\,x_0+1$	$x_0^2-2\,x_0+1$
$\begin{pmatrix} -x_0 & -x_0 \\ -2\,x_0 & x_0 \end{pmatrix}$	$-3\,x_0^2$	$-3\,x_0^2+1$	$-3\,x_0^2+1$
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	$-x_0^2+1$	$-x_0^2+1$
$\begin{pmatrix} \frac{1}{2}\,x_0 & \frac{1}{2}\,x_0 \\ -\frac{1}{2}\,x_0 & x_0 \end{pmatrix}$	$\frac{3}{4}\,x_0^2$	$\frac{3}{4}\,x_0^2+\frac{3}{2}\,x_0+1$	$\frac{3}{4}\,x_0^2-\frac{3}{2}\,x_0+1$
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	$-x_0^2+1$	$-x_0^2+1$
$\begin{pmatrix} -x_0 & \frac{1}{2}\,x_0 \\ -\frac{1}{2}\,x_0 & x_0 \end{pmatrix}$	$-\frac{3}{4}\,x_0^2$	$-\frac{3}{4}\,x_0^2+1$	$-\frac{3}{4}\,x_0^2+1$
$\begin{pmatrix} 2\,x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	$3\,x_0^2$	$3\,x_0^2+3\,x_0+1$	$3\,x_0^2-3\,x_0+1$
$\begin{pmatrix} -x_0 & 2\,x_0 \\ x_0 & x_0 \end{pmatrix}$	$-3\,x_0^2$	$-3\,x_0^2+1$	$-3\,x_0^2+1$
$\begin{pmatrix} -x_0 & 2\,x_0 \\ -2\,x_0 & x_0 \end{pmatrix}$	$3\,x_0^2$	$3\,x_0^2+1$	$3\,x_0^2+1$

matrix	det	except
$\begin{pmatrix} -x_0 & 0 \\ -x_0 & x_0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	x_0^2	-1 1
$\begin{pmatrix} -x_0 & -x_0 \\ -2\,x_0 & x_0 \end{pmatrix}$	$-3\,x_0^2$	[]
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} \frac{1}{2}\,x_0 & \frac{1}{2}\,x_0 \\ -\frac{1}{2}\,x_0 & x_0 \end{pmatrix}$	$\frac{3}{4}\,x_0^2$	[]
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	$-x_0^2$	-1 1
$\begin{pmatrix} -x_0 & \frac{1}{2}\,x_0 \\ -\frac{1}{2}\,x_0 & x_0 \end{pmatrix}$	$-\frac{3}{4}\,x_0^2$	[]
$\begin{pmatrix} 2\,x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	$3\,x_0^2$	[]
$\begin{pmatrix} -x_0 & 2\,x_0 \\ x_0 & x_0 \end{pmatrix}$	$-3\,x_0^2$	[]
$\begin{pmatrix} -x_0 & 2\,x_0 \\ -2\,x_0 & x_0 \end{pmatrix}$	$3\,x_0^2$	[]

matrix	conds
$\begin{pmatrix} -x_0 & 0 \\ -x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} x_0 & -x_0 \\ x_0 & 0 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ -x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} x_0 & 0 \\ 0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & -x_0 \\ -2\,x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} 0 & x_0 \\ x_0 & 0 \end{pmatrix}$	[]
$\begin{pmatrix} \frac{1}{2}\,x_0 & \frac{1}{2}\,x_0 \\ -\frac{1}{2}\,x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & x_0 \\ 0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & \frac{1}{2}\,x_0 \\ -\frac{1}{2}\,x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} 2\,x_0 & -x_0 \\ x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & 2\,x_0 \\ x_0 & x_0 \end{pmatrix}$	[]
$\begin{pmatrix} -x_0 & 2\,x_0 \\ -2\,x_0 & x_0 \end{pmatrix}$	[]