

g-matrices of st-tilt(D_4)

[[1, 0, 0, 0],
 [0, 1, 0, 0],
 [0, 0, 1, 0],
 [0, 0, 0, 1]]

[[-1, 0, 0, 0],
 [0, -1, 0, 0],
 [0, 0, -1, 0],
 [0, 0, 0, -1]]

[[0, 0, 1, 0],
 [0, 0, 1, -1],
 [1, 0, 0, 0],
 [0, 1, 0, 0]]

[[1, 1, -1, 1],
 [0, 0, 0, 1],
 [1, 0, 0, 0],
 [0, 1, 0, 0]]

[[0, -1, 1, 0],
 [0, 0, 1, 0],
 [0, 0, 0, 1],
 [1, 0, 0, 0]]

[[-1, 0, 1, 0],
 [0, 0, 1, 0],
 [0, 0, 0, 1],
 [0, 1, 0, 0]]

[[0, 1, 0, 0],
 [1, 0, 0, 0],
 [0, 0, 1, -1],
 [0, 0, 0, -1]]

[[0, -1, 1, 0],
 [0, 0, 1, 0],
 [0, 0, 1, -1],
 [1, 0, 0, 0]]

```

[[ -1,  0,  1,  0],
 [  0,  0,  1,  0],
 [  0,  0,  1, -1],
 [  0,  1,  0,  0]]

```

```

-----
[[  1,  1, -1,  1],
 [  1,  1, -1,  0],
 [  1,  0,  0,  0],
 [  0,  1,  0,  0]]

```

```

-----
[[  2,  0, -1,  1],
 [  1,  1, -1,  1],
 [  0,  0,  0,  1],
 [  1,  0,  0,  0]]

```

```

-----
[[  0,  1, -1,  1],
 [  1,  1, -1,  1],
 [  0,  0,  0,  1],
 [  0,  1,  0,  0]]

```

```

-----
[[  0, -1,  1,  0],
 [  0,  0,  0,  1],
 [  1, -1,  0,  0],
 [  1,  0,  0,  0]]

```

```

-----
[[ -1,  0,  1,  0],
 [  0, -1,  1,  0],
 [  0,  0,  1,  0],
 [  0,  0,  0,  1]]

```

```

-----
[[ -1,  0,  1,  0],
 [  0,  0,  0,  1],
 [ -1,  1,  0,  0],
 [  0,  1,  0,  0]]

```

```

-----
[[  1,  1, -1,  0],
 [  0,  1,  0,  0],
 [  1,  0,  0,  0],
 [  0,  0,  0, -1]]

```

```

-----
[[ -1,  0,  1, -1],
 [  0,  1,  0,  0],
 [  0,  0,  1, -1],

```

$$\begin{bmatrix} 0 & 0 & 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & -1 & 1 & -1 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & -1 & 1 & 0 \\ 0 & -1 & 1 & -1 \\ 0 & 0 & 1 & -1 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 0 & 1 & 0 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & -1 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 0 & 1 & 0 \\ -1 & 0 & 1 & -1 \\ 0 & 0 & 1 & -1 \\ 0 & 1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 0 & -1 & 1 \\ 1 & 1 & -1 & 1 \\ 1 & 1 & -1 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1 & -1 & 1 \\ 1 & 1 & -1 & 1 \\ 1 & 1 & -1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 0 & -1 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & -1 & 1 \\ 2 & 0 & -1 & 1 \\ 1 & 1 & -1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1 & -1 & 1 \end{bmatrix}$$

```

[ 0, 0, 0, 1 ],
[ -1, 1, 0, 0 ],
[ 0, 1, 0, 0 ]]
-----
[[ 1, 0, -1, 1 ],
 [ 0, 1, -1, 1 ],
 [ 1, 1, -1, 1 ],
 [ 0, 0, 0, 1 ]]
-----
[[ 0, -1, 1, 0 ],
 [ 0, -1, 1, -1 ],
 [ 1, -1, 0, 0 ],
 [ 1, 0, 0, 0 ]]
-----
[[ 0, 0, 0, 1 ],
 [ 0, -1, 1, 0 ],
 [ 1, -1, 0, 0 ],
 [ 0, -1, 0, 0 ]]
-----
[[ -1, -1, 1, 0 ],
 [ -1, 0, 1, 0 ],
 [ 0, -1, 1, 0 ],
 [ 0, 0, 0, 1 ]]
-----
[[ -1, 0, 1, 0 ],
 [ -1, 0, 1, -1 ],
 [ -1, 1, 0, 0 ],
 [ 0, 1, 0, 0 ]]
-----
[[ -2, 0, 1, 0 ],
 [ -1, 0, 1, 0 ],
 [ 0, 0, 0, 1 ],
 [ -1, 1, 0, 0 ]]
-----
[[ 1, 1, -1, 0 ],
 [ 0, 1, 0, 0 ],
 [ 0, 1, -1, 0 ],
 [ 0, 0, 0, -1 ]]
-----
[[ 2, 0, -1, 0 ],
 [ 1, 1, -1, 0 ],
 [ 1, 0, 0, 0 ],
 [ 0, 0, 0, -1 ]]

```

 $\begin{bmatrix} -1, & 1, & 0, & 0], \\ & [-1, & 0, & 1, & -1], \\ & [0, & 1, & 0, & 0], \\ & [0, & 0, & 0, & -1]]$

 $\begin{bmatrix} 0, & -1, & 1, & -1], \\ & [-1, & 0, & 1, & -1], \\ & [0, & 0, & 1, & -1], \\ & [0, & 0, & 0, & -1]]$

 $\begin{bmatrix} 1, & -1, & 0, & 0], \\ & [0, & -1, & 1, & -1], \\ & [1, & 0, & 0, & 0], \\ & [0, & 0, & 0, & -1]]$

 $\begin{bmatrix} -1, & -1, & 2, & -1], \\ & [0, & -1, & 1, & 0], \\ & [0, & -1, & 1, & -1], \\ & [0, & 0, & 1, & -1]]$

 $\begin{bmatrix} -1, & -1, & 2, & -1], \\ & [-1, & 0, & 1, & 0], \\ & [0, & -1, & 1, & 0], \\ & [0, & 0, & 1, & -1]]$

 $\begin{bmatrix} -1, & -1, & 2, & -1], \\ & [-1, & 0, & 1, & 0], \\ & [-1, & 0, & 1, & -1], \\ & [0, & 0, & 1, & -1]]$

 $\begin{bmatrix} 2, & 0, & -1, & 1], \\ & [2, & 0, & -1, & 0], \\ & [1, & 1, & -1, & 0], \\ & [1, & 0, & 0, & 0]]$

 $\begin{bmatrix} 1, & 0, & -1, & 1], \\ & [2, & 0, & -1, & 1], \\ & [1, & 1, & -1, & 1], \\ & [1, & 1, & -1, & 0]]$

 $\begin{bmatrix} 0, & 1, & -1, & 1], \\ & [1, & 1, & -1, & 0],$

$$\begin{bmatrix} 0, & 1, & 0, & 0], \\ 0, & 1, & -1, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 1, & 0, & -1, & 1], \\ 0, & 1, & -1, & 1], \\ 1, & 1, & -1, & 1], \\ 1, & 1, & -1, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 2, & 0, & -1, & 1], \\ 2, & 0, & -1, & 0], \\ 1, & -1, & 0, & 0], \\ 1, & 0, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 1, & 0, & -1, & 1], \\ 2, & 0, & -1, & 1], \\ 0, & 0, & 0, & 1], \\ 1, & -1, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 0, & 1, & -1, & 1], \\ -1, & 1, & 0, & 0], \\ 0, & 1, & 0, & 0], \\ 0, & 1, & -1, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 0, & 0, & 0, & 1], \\ 0, & 1, & -1, & 1], \\ -1, & 1, & 0, & 0], \\ -1, & 0, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 0, & 0, & -1, & 1], \\ 1, & 0, & -1, & 1], \\ 0, & 1, & -1, & 1], \\ 0, & 0, & 0, & 1]] \end{bmatrix}$$

$$\begin{bmatrix} 0, & -1, & 1, & 0], \\ 1, & -1, & 0, & 0], \\ 0, & -1, & 1, & -1], \\ 0, & -1, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 1, & 0, & -1, & 1], \\ 0, & 0, & 0, & 1], \\ 1, & -1, & 0, & 0], \\ 0, & -1, & 0, & 0]] \end{bmatrix}$$

```

[[ -1, -1,  1,  0],
 [  0,  0,  0,  1],
 [  0, -1,  1,  0],
 [  0, -1,  0,  0]]

```

```

-----
[[ -1, -1,  2, -1],
 [ -1, -1,  1,  0],
 [ -1,  0,  1,  0],
 [  0, -1,  1,  0]]

```

```

-----
[[ -2,  0,  1,  0],
 [ -1, -1,  1,  0],
 [ -1,  0,  1,  0],
 [  0,  0,  0,  1]]

```

```

-----
[[ -2,  0,  1,  0],
 [ -1,  0,  1,  0],
 [ -1,  0,  1, -1],
 [ -1,  1,  0,  0]]

```

```

-----
[[  0,  0,  0,  1],
 [ -2,  0,  1,  0],
 [ -1,  1,  0,  0],
 [ -1,  0,  0,  0]]

```

```

-----
[[  1,  1, -1,  0],
 [  0,  1, -1,  0],
 [  1,  0, -1,  0],
 [  0,  0,  0, -1]]

```

```

-----
[[ -1,  1,  0,  0],
 [  0,  1,  0,  0],
 [  0,  1, -1,  0],
 [  0,  0,  0, -1]]

```

```

-----
[[  2,  0, -1,  0],
 [  1,  1, -1,  0],
 [  1,  0, -1,  0],
 [  0,  0,  0, -1]]

```

```

-----
[[  1, -1,  0,  0],
 [  2,  0, -1,  0],
 [  1,  0,  0,  0],

```

[0, 0, 0, -1]]

[[-2, 0, 1, -1],
[-1, 1, 0, 0],
[-1, 0, 1, -1],
[0, 0, 0, -1]]

[[-1, -1, 1, -1],
[0, -1, 1, -1],
[-1, 0, 1, -1],
[0, 0, 0, -1]]

[[0, -1, 1, -1],
[1, -1, 0, 0],
[0, -1, 0, 0],
[0, 0, 0, -1]]

[[-1, -1, 2, -1],
[-1, 0, 1, -1],
[0, -1, 1, -1],
[0, 0, 1, -1]]

[[-1, -1, 1, 0],
[-1, -1, 2, -1],
[0, -1, 1, 0],
[0, -1, 1, -1]]

[[-1, -1, 1, 0],
[-1, -1, 2, -1],
[-1, 0, 1, 0],
[-1, 0, 1, -1]]

[[1, 0, -1, 1],
[2, 0, -1, 1],
[2, 0, -1, 0],
[1, 1, -1, 0]]

[[1, 1, -2, 1],
[0, 1, -1, 1],
[1, 1, -1, 0],
[0, 1, -1, 0]]

[[1, 1, -2, 1],

$$\begin{bmatrix} 1, & 0, & -1, & 1], \\ 0, & 1, & -1, & 1], \\ 1, & 1, & -1, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 1, & 0, & -1, & 1], \\ 2, & 0, & -1, & 1], \\ 2, & 0, & -1, & 0], \\ 1, & -1, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 0, & 1, & -1, & 1], \\ -1, & 1, & 0, & 0], \\ 0, & 1, & -1, & 0], \\ -1, & 0, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 0, & 0, & -1, & 1], \\ 0, & 0, & 0, & 1], \\ 0, & 1, & -1, & 1], \\ -1, & 0, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 1, & 1, & -2, & 1], \\ 0, & 0, & -1, & 1], \\ 1, & 0, & -1, & 1], \\ 0, & 1, & -1, & 1]] \end{bmatrix}$$

$$\begin{bmatrix} 0, & 0, & 0, & 1], \\ 1, & 0, & -1, & 1], \\ 0, & 0, & -1, & 1], \\ 0, & -1, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} -1, & -1, & 1, & 0], \\ 0, & -1, & 1, & 0], \\ 0, & -1, & 1, & -1], \\ 0, & -1, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 1, & 0, & -1, & 1], \\ 1, & -1, & 0, & 0], \\ 1, & 0, & -1, & 0], \\ 0, & -1, & 0, & 0]] \end{bmatrix}$$

$$\begin{bmatrix} 0, & 0, & 0, & 1], \\ -1, & -1, & 1, & 0], \\ -1, & 0, & 0, & 0], \\ 0, & -1, & 0, & 0]] \end{bmatrix}$$

 $\begin{bmatrix} -2, & 0, & 1, & 0], \\ & [-1, & -1, & 1, & 0], \\ & [-1, & 0, & 1, & 0], \\ & [-1, & 0, & 1, & -1]]$

 $\begin{bmatrix} 0, & 0, & 0, & 1], \\ & [-1, & -1, & 1, & 0], \\ & [-2, & 0, & 1, & 0], \\ & [-1, & 0, & 0, & 0]]$

 $\begin{bmatrix} -2, & 0, & 1, & 0], \\ & [-2, & 0, & 1, & -1], \\ & [-1, & 0, & 1, & -1], \\ & [-1, & 1, & 0, & 0]]$

 $\begin{bmatrix} -2, & 0, & 1, & 0], \\ & [-2, & 0, & 1, & -1], \\ & [-1, & 1, & 0, & 0], \\ & [-1, & 0, & 0, & 0]]$

 $\begin{bmatrix} 0, & 1, & -1, & 0], \\ & [1, & 0, & -1, & 0], \\ & [0, & 0, & -1, & 0], \\ & [0, & 0, & 0, & -1]]$

 $\begin{bmatrix} -1, & 1, & 0, & 0], \\ & [0, & 1, & -1, & 0], \\ & [-1, & 0, & 0, & 0], \\ & [0, & 0, & 0, & -1]]$

 $\begin{bmatrix} 1, & -1, & 0, & 0], \\ & [2, & 0, & -1, & 0], \\ & [1, & 0, & -1, & 0], \\ & [0, & 0, & 0, & -1]]$

 $\begin{bmatrix} -1, & 1, & 0, & 0], \\ & [-2, & 0, & 1, & -1], \\ & [-1, & 0, & 0, & 0], \\ & [0, & 0, & 0, & -1]]$

 $\begin{bmatrix} -1, & -1, & 1, & -1], \\ & [-2, & 0, & 1, & -1], \end{bmatrix}$

$$\begin{bmatrix} -1, & 0, & 1, & -1 \\ 0, & 0, & 0, & -1 \end{bmatrix}$$

$$\begin{bmatrix} 0, & -1, & 1, & -1 \\ -1, & -1, & 1, & -1 \\ 0, & -1, & 0, & 0 \\ 0, & 0, & 0, & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1, & -1, & 0, & 0 \\ 1, & 0, & -1, & 0 \\ 0, & -1, & 0, & 0 \\ 0, & 0, & 0, & -1 \end{bmatrix}$$

$$\begin{bmatrix} -1, & -1, & 1, & 0 \\ -1, & -1, & 2, & -1 \\ -1, & 0, & 1, & -1 \\ 0, & -1, & 1, & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1, & 0, & -1, & 1 \\ 2, & 0, & -1, & 0 \\ 1, & 1, & -1, & 0 \\ 1, & 0, & -1, & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1, & 1, & -2, & 1 \\ 1, & 1, & -1, & 0 \\ 0, & 1, & -1, & 0 \\ 1, & 0, & -1, & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0, & 0, & -1, & 1 \\ 1, & 1, & -2, & 1 \\ 0, & 1, & -1, & 1 \\ 0, & 1, & -1, & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1, & 1, & -2, & 1 \\ 1, & 0, & -1, & 1 \\ 1, & 1, & -1, & 0 \\ 1, & 0, & -1, & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1, & 0, & -1, & 1 \\ 2, & 0, & -1, & 0 \\ 1, & -1, & 0, & 0 \\ 1, & 0, & -1, & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & -1 & 1 \\ 0 & 1 & -1 & 1 \\ 0 & 1 & -1 & 0 \\ -1 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & -1 & 1 \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 \\ 0 & 0 & -1 & 1 \\ 1 & 0 & -1 & 1 \\ 1 & 0 & -1 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & -1 & 1 \\ 0 & 0 & -1 & 1 \\ 1 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} -1 & -1 & 1 & 0 \\ -1 & -1 & 1 & -1 \\ 0 & -1 & 1 & -1 \\ 0 & -1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} -1 & -1 & 1 & 0 \\ -1 & -1 & 1 & -1 \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} -2 & 0 & 1 & 0 \\ -1 & -1 & 1 & 0 \\ -2 & 0 & 1 & -1 \\ -1 & 0 & 1 & -1 \end{bmatrix}$$

$$\begin{bmatrix} -1 & -1 & 1 & 0 \\ -2 & 0 & 1 & 0 \\ -2 & 0 & 1 & -1 \\ -1 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{bmatrix}$$

```

    [ 0, 0, 0, -1 ]
-----
[[ 0, 1, -1, 0 ],
 [ -1, 0, 0, 0 ],
 [ 0, 0, -1, 0 ],
 [ 0, 0, 0, -1 ]]
-----
[[ -1, -1, 1, -1 ],
 [ -2, 0, 1, -1 ],
 [ -1, 0, 0, 0 ],
 [ 0, 0, 0, -1 ]]
-----
[[ -1, -1, 1, -1 ],
 [ -1, 0, 0, 0 ],
 [ 0, -1, 0, 0 ],
 [ 0, 0, 0, -1 ]]
-----
[[ -1, -1, 1, 0 ],
 [ -1, -1, 1, -1 ],
 [ -1, 0, 1, -1 ],
 [ 0, -1, 1, -1 ]]
-----
[[ 0, 0, -1, 1 ],
 [ 1, 1, -2, 1 ],
 [ 0, 1, -1, 0 ],
 [ 1, 0, -1, 0 ]]
-----
[[ 0, 0, -1, 1 ],
 [ 0, 1, -1, 0 ],
 [ -1, 0, 0, 0 ],
 [ 0, 0, -1, 0 ]]
-----
[[ 0, 0, -1, 1 ],
 [ -1, 0, 0, 0 ],
 [ 0, -1, 0, 0 ],
 [ 0, 0, -1, 0 ]]
-----
[[ 0, 0, -1, 1 ],
 [ 1, 0, -1, 0 ],
 [ 0, -1, 0, 0 ],
 [ 0, 0, -1, 0 ]]
-----
[[ -1, -1, 1, 0 ],

```

```

[ -1, -1,  1, -1 ],
[ -2,  0,  1, -1 ],
[ -1,  0,  1, -1 ]]
-----
[[ -1, -1,  1,  0 ],
 [ -1, -1,  1, -1 ],
 [ -2,  0,  1, -1 ],
 [ -1,  0,  0,  0 ]]
-----
[[  0,  0, -1,  1 ],
 [  0,  1, -1,  0 ],
 [  1,  0, -1,  0 ],
 [  0,  0, -1,  0 ]]
-----
-----
Number: 114

```