Notes on construction of $GH(12, EA(4))$ from 2 Hadamard matrices

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Abstract

Making 2 Hadamard matrices of order 12 such that their Hadamard product is also Hadamard. A $GH(12, EA(4))$ is constructed from the 2 Hadamard matrices.

1 Construction

Let A, B, C, D be the following matrices :

$$A = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} B = \begin{pmatrix} 0 & 1 & 0 & 0 \\ - & 0 & 0 & 0 \\ 0 & 0 & 0 & - \\ 0 & 0 & 1 & 0 \end{pmatrix} C = \begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ - & 0 & 0 & 0 \\ 0 & - & 0 & 0 \end{pmatrix} D = \begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & - & 0 \\ 0 & 1 & 0 & 0 \\ - & 0 & 0 & 0 \end{pmatrix}$$

2 circulant matrices of order 3,

$$C1 = \begin{pmatrix} - & 1 & - \\ - & - & 1 \\ 1 & - & - \end{pmatrix},$$

$$C2 = \begin{pmatrix} 1 & 1 & - \\ - & 1 & 1 \\ 1 & 1 & - \end{pmatrix}$$

To make the 2 Hadamard matrices from A, B, C, D, the following method was used:
$H_1 = (J \otimes A) + (C1 \otimes B) + (C1 \otimes C) + (C1 \otimes D)$
$H_2 = (J \otimes A) + (C2 \otimes B) + (C2 \otimes C) + (C2 \otimes D)$

H_1 and H_2 are always Hadamard matrices, because of the structure of A, B, C, D and the construction above.
If the Hadamard product of H_1 and H_2 is Hadamard, a Generalized Hadamard matrix can be constructed from H_1 and H_2. Otherwise, row and column permutations can be applied on H_1 and H_2 to see if their Hadamard product is Hadamard.

$$H_1 = \begin{pmatrix} (A-B-C-D) & (A+B+C+D) & (A-B-C-D) \\ (A-B-C-D) & (A-B-C-D) & (A+B+C+D) \\ (A+B+C+D) & (A-B-C-D) & (A-B-C-D) \end{pmatrix}$$

$$H_2 = \begin{pmatrix} (A+B+C+D) & (A+B+C+D) & (A-B-C-D) \\ (A-B-C-D) & (A+B+C+D) & (A+B+C+D) \\ (A+B+C+D) & (A-B-C-D) & (A+B+C+D) \end{pmatrix},$$

Matrices H_1 and H_2 can be represented as a $3X3$ matrix consisting of block matrices of the order $4X4$.
If $A^{'} = A+B+C+D$, and $B^{'} = A-B-C-D$

$$H_1 = \begin{pmatrix} B^{'} & A^{'} & B^{'} \\ B^{'} & B^{'} & A^{'} \\ A^{'} & B^{'} & B^{'} \end{pmatrix}$$

$$H_2 = \begin{pmatrix} A^{'} & A^{'} & B^{'} \\ B^{'} & A^{'} & A^{'} \\ A^{'} & B^{'} & A^{'} \end{pmatrix}$$

Each of $A^{'}$ and $B^{'}$ is a Hadamard matrix, so, in H_1 and H_2, permuting rows/columns inside row/column blocks should still yield a Hadamard matrix.Only permutations of this type are considered.Thus the Hadamard matrix after permutation would look like this:
(where α, β, γ represent a permutation matrix of order $4x4$)

$$H_2^{'} = \begin{pmatrix} \alpha A^{'} & \alpha A^{'} & \alpha B^{'} \\ \beta B^{'} & \beta A^{'} & \beta A^{'} \\ \gamma A^{'} & \gamma B^{'} & \gamma A^{'} \end{pmatrix}$$

Similarly for column permutations,

$$H_2^{'} = \begin{pmatrix} A^{'}\alpha & A^{'}\beta & B^{'}\gamma \\ B^{'}\alpha & A^{'}\beta & A^{'}\gamma \\ A^{'}\alpha & B^{'}\beta & A^{'}\gamma \end{pmatrix}$$

The row(column) permutations can be represented by a block diagonal matrix of the following type.

$$P = \begin{pmatrix} \alpha & & 0 \\ & \beta & \\ 0 & & \gamma \end{pmatrix}$$

Here, α, β, γ represent any permutation matrix of the order $4X4$.
We can assume without loss of generality that any permutation of the rows and columns of H_1 and H_2 can be split as only row permutations on H_1, and only column permutations on H_2. By this we mean that instead of performing both row and column permutations on both of the matrices, it is possible to split the permutations as row permutations and column permutations seperately,with the row permutations(say) performed on H_1 and column permutations on H_2. This is done keeping in mind that the Hadamard product of the two matrices does not change if the permutations are split this way.

Thus, two permutation matrices are obtained, a row permutation(say) for H_1 called P_1 and column permutations(say) for H_2 called P_2.
We take the following Hadamard product and check if the resulting matrix is Hadamard or not.
$H = (P_1 \times H_1) \odot (H_2 \times P_2)$

2 Some observations

α, β, γ can take on 24 values each, as there are 24 possible permutations for a $4X4$ matrix.

So, there are in total, 24x24x24 permutation matrices of order 12 of the permissible type discussed above.
P_1, P_2,H,GH have the same meaning as in the previous section.
Listed in the appendix are some(not all) permutation matrices P_1 and P_2 for which H is a Hadamard matrix, and GH is a Generalized Hadamard matrix. But for none of them are α, β, γ all from the set $\{I_2 \otimes I_2,\ I_2 \otimes R_2, R_2 \otimes I_2, R_2 \otimes R_2\}$

3 Suggestions

4 Appendix

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\ 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 1 & 3 & 2 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\ 3 & 3 & 2 & 1 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\ 3 & 2 & 1 & 3 & 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 \\ 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 3 & 1 & 2 & 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 \\ 1 & 1 & 2 & 3 & 3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 \\ 1 & 2 & 3 & 1 & 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 \\ 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 \\ 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 1 & 3 & 2 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\ 3 & 3 & 2 & 1 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\ 3 & 2 & 1 & 3 & 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 \\ 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 3 & 1 & 2 & 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 \\ 1 & 1 & 2 & 3 & 3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 \\ 1 & 2 & 3 & 1 & 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 4 & 2 & 3 & 1 & 1 & 1 & 2 & 3 & 3 & 1 & 2 & 3 \\ 4 & 3 & 1 & 2 & 1 & 2 & 3 & 1 & 3 & 2 & 3 & 1 \\ 4 & 1 & 2 & 3 & 1 & 3 & 1 & 2 & 3 & 3 & 1 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&1&1&1&1\\ 1&-1&1&1&-1&1&1&-1&1&1&-1&-1\\ -1&-1&-1&1&-1&1&-1&1&1&-1&-1&1\\ 1&1&-1&1&1&1&-1&-1&1&-1&1&-1\\ -1&-1&1&1&1&-1&-1&-1&1&1&1&1\\ -1&1&1&-1&1&1&-1&1&1&1&-1&-1\\ 1&1&1&1&1&-1&1&1&1&-1&-1&1\\ 1&-1&1&-1&-1&-1&-1&1&1&-1&1&-1\\ -1&1&-1&1&-1&-1&1&1&1&1&1&-1\\ -1&-1&1&1&1&1&1&1&-1&-1&1&-1\\ 1&1&1&1&-1&1&-1&1&-1&1&1&1\\ 1&-1&-1&1&1&-1&-1&1&-1&1&-1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&1&4&4&4\\ 1&3&1&4&2&1&4&3&1&1&3&2\\ 3&3&2&1&2&4&3&1&1&3&2&1\\ 1&4&3&1&4&1&3&2&1&2&1&3\\ 3&2&4&4&1&2&2&2&1&1&1&1\\ 3&1&1&2&1&1&3&4&4&1&2&3\\ 1&1&4&1&1&3&4&1&4&2&3&1\\ 1&2&1&3&3&2&3&1&4&3&1&2\\ 2&1&2&1&3&3&1&4&1&1&1&2\\ 2&3&1&4&1&4&1&1&3&2&1&3\\ 4&4&1&1&3&1&2&1&3&1&4&1\\ 1&3&3&1&1&2&2&4&3&4&2&2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\ -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 1 & 3 & 1 & 4 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\ 1 & 1 & 4 & 3 & 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 \\ 3 & 2 & 1 & 3 & 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 \\ 3 & 4 & 4 & 2 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 1 & 3 & 2 & 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 \\ 3 & 1 & 2 & 1 & 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 \\ 1 & 4 & 1 & 1 & 1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 \\ 2 & 1 & 2 & 1 & 3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 \\ 2 & 4 & 1 & 3 & 1 & 1 & 4 & 1 & 3 & 1 & 2 & 3 \\ 1 & 1 & 3 & 3 & 1 & 2 & 2 & 4 & 3 & 2 & 4 & 2 \\ 4 & 1 & 1 & 4 & 3 & 2 & 1 & 1 & 3 & 4 & 1 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 \\
-1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\
1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\
-1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\
-1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 \\
1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 \\
1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\
-1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 \\
1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 \\
1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 \\
-1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\
1 & 3 & 1 & 4 & 2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 \\
3 & 3 & 2 & 1 & 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 \\
1 & 4 & 3 & 1 & 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 \\
3 & 2 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\
3 & 1 & 1 & 2 & 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 \\
1 & 1 & 4 & 1 & 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 \\
1 & 2 & 1 & 3 & 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 \\
2 & 1 & 1 & 2 & 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 \\
1 & 3 & 1 & 3 & 1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 \\
4 & 4 & 1 & 1 & 3 & 1 & 2 & 1 & 3 & 1 & 4 & 1 \\
2 & 3 & 4 & 1 & 1 & 1 & 1 & 4 & 3 & 3 & 1 & 2
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&1&1&1&1\\ -1&1&-1&-1&-1&1&1&-1&1&1&-1&-1\\ 1&1&1&-1&1&-1&1&-1&1&-1&-1&1\\ 1&1&-1&1&-1&-1&1&1&1&-1&1&-1\\ -1&1&-1&1&1&-1&-1&-1&1&1&1&1\\ 1&1&1&1&1&1&-1&1&1&1&-1&-1\\ 1&-1&-1&1&-1&1&-1&-1&1&-1&-1&1\\ -1&-1&1&1&1&1&1&-1&1&-1&1&-1\\ -1&1&1&-1&-1&1&-1&1&1&-1&1&1\\ 1&1&1&1&-1&1&1&-1&-1&1&1&1\\ 1&1&-1&-1&1&1&-1&-1&-1&-1&1&-1\\ -1&1&-1&1&1&1&1&1&-1&-1&-1&1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&1&4&4&4\\ 3&1&3&2&2&1&4&3&1&1&3&2\\ 1&1&4&3&4&2&1&3&1&3&2&1\\ 1&4&3&1&2&3&1&4&1&2&1&3\\ 3&4&2&4&1&2&2&2&1&1&1&1\\ 1&1&1&4&1&1&3&4&4&1&2&3\\ 1&3&2&1&3&1&2&3&4&2&3&1\\ 3&2&1&1&1&4&1&3&4&3&1&2\\ 2&1&1&2&3&4&3&1&1&2&1&1\\ 4&1&4&1&3&1&1&2&3&1&1&4\\ 1&1&3&3&1&4&2&2&3&2&4&2\\ 2&4&3&1&1&1&4&1&3&3&2&1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\ -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 \\ 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 \\ -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 1 & 3 & 1 & 4 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\ 1 & 1 & 4 & 3 & 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 \\ 3 & 2 & 1 & 3 & 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 \\ 3 & 4 & 4 & 2 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 1 & 3 & 2 & 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 \\ 3 & 1 & 2 & 1 & 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 \\ 1 & 4 & 1 & 1 & 1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 \\ 2 & 2 & 1 & 1 & 3 & 1 & 4 & 3 & 1 & 1 & 2 & 1 \\ 1 & 3 & 1 & 3 & 1 & 2 & 4 & 2 & 3 & 2 & 2 & 4 \\ 2 & 1 & 4 & 3 & 1 & 1 & 1 & 4 & 3 & 1 & 3 & 2 \\ 4 & 1 & 1 & 4 & 3 & 2 & 1 & 1 & 3 & 4 & 1 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&1&1&1&1\\ -1&1&-1&-1&-1&1&1&-1&1&1&-1&-1\\ 1&1&1&-1&1&-1&1&-1&1&-1&-1&1\\ 1&1&-1&1&-1&-1&1&1&1&-1&1&-1\\ -1&1&-1&1&1&-1&-1&-1&1&1&1&1\\ 1&1&1&1&1&1&-1&1&1&1&-1&-1\\ 1&-1&-1&1&-1&1&-1&-1&1&-1&-1&1\\ -1&-1&1&1&1&1&1&-1&1&-1&1&-1\\ -1&-1&1&1&-1&-1&1&1&1&1&-1&1\\ 1&1&1&1&-1&1&1&-1&-1&1&1&1\\ -1&1&-1&1&1&1&1&1&-1&-1&-1&1\\ 1&-1&-1&1&1&-1&1&-1&-1&1&-1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&1&4&4&4\\ 3&1&3&2&2&1&4&3&1&1&3&2\\ 1&1&4&3&4&2&1&3&1&3&2&1\\ 1&4&3&1&2&3&1&4&1&2&1&3\\ 3&4&2&4&1&2&2&2&1&1&1&1\\ 1&1&1&4&1&1&3&4&4&1&2&3\\ 1&3&2&1&3&1&2&3&4&2&3&1\\ 3&2&1&1&1&4&1&3&4&3&1&2\\ 2&2&1&1&3&3&4&1&1&1&2&1\\ 4&1&4&1&3&1&1&2&3&1&1&4\\ 2&1&3&4&1&4&1&1&3&2&3&1\\ 1&3&3&1&1&2&4&2&3&4&2&2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 & 1 & 3 & 1 & 2 \\ 3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 & 1 & 1 & 2 & 3 \\ 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 3 & 1 \\ 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 & 4 & 1 & 3 & 2 \\ 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 & 4 & 3 & 2 & 1 \\ 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 & 4 & 2 & 1 & 3 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 \\ 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \\ 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
-1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\
-1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\
-1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\
1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\
1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\
1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\
1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\
1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\
1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\
3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 & 1 & 3 & 1 & 2 \\
3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 & 1 & 1 & 2 & 3 \\
3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 3 & 1 \\
1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\
1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 & 4 & 1 & 3 & 2 \\
1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 & 4 & 3 & 2 & 1 \\
1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 & 4 & 2 & 1 & 3 \\
1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\
4 & 3 & 1 & 2 & 1 & 2 & 3 & 1 & 3 & 2 & 3 & 1 \\
4 & 1 & 2 & 3 & 1 & 3 & 1 & 2 & 3 & 3 & 1 & 2 \\
4 & 2 & 3 & 1 & 1 & 1 & 2 & 3 & 3 & 1 & 2 & 3
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$
P2 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
-1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\
-1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\
-1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\
1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\
1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\
1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\
1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\
1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\
1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\
3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 & 1 & 3 & 1 & 2 \\
3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 & 1 & 1 & 2 & 3 \\
3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 3 & 1 \\
1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\
1 & 1 & 2 & 3 & 3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 \\
1 & 2 & 3 & 1 & 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 \\
1 & 3 & 1 & 2 & 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 \\
1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\
4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 \\
4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \\
4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&1&1&1&1\\ -1&-1&1&-1&1&1&-1&-1&1&1&-1&-1\\ -1&1&-1&-1&1&-1&-1&1&1&-1&-1&1\\ -1&-1&-1&1&1&-1&1&-1&1&-1&1&-1\\ 1&1&1&1&1&-1&-1&-1&1&1&1&1\\ 1&1&-1&-1&-1&1&-1&-1&1&-1&1&-1\\ 1&-1&-1&1&-1&-1&-1&1&1&1&-1&-1\\ 1&-1&1&-1&-1&-1&1&-1&1&-1&-1&1\\ 1&1&1&1&1&1&1&1&1&-1&-1&-1\\ 1&-1&1&-1&1&-1&-1&1&-1&-1&1&-1\\ 1&1&-1&-1&1&-1&1&-1&-1&1&-1&-1\\ 1&-1&-1&1&1&1&-1&-1&-1&-1&-1&1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&1&4&4&4\\ 3&3&1&2&4&1&2&3&1&1&3&2\\ 3&1&2&3&4&2&3&1&1&3&2&1\\ 3&2&3&1&4&3&1&2&1&2&1&3\\ 1&4&4&4&1&2&2&2&1&1&1&1\\ 1&1&2&3&3&1&2&3&4&2&1&3\\ 1&2&3&1&3&2&3&1&4&1&3&2\\ 1&3&1&2&3&3&1&2&4&3&2&1\\ 1&1&1&1&1&4&4&4&1&2&2&2\\ 4&3&1&2&1&2&3&1&3&2&1&3\\ 4&1&2&3&1&3&1&2&3&1&3&2\\ 4&2&3&1&1&1&2&3&3&3&2&1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\ 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 & 1 & 3 & 1 & 2 \\ 3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 & 1 & 1 & 2 & 3 \\ 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 3 & 1 \\ 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 1 & 2 & 3 & 3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 \\ 1 & 2 & 3 & 1 & 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 \\ 1 & 3 & 1 & 2 & 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 4 & 3 & 1 & 2 & 1 & 2 & 3 & 1 & 3 & 2 & 3 & 1 \\ 4 & 1 & 2 & 3 & 1 & 3 & 1 & 2 & 3 & 3 & 1 & 2 \\ 4 & 2 & 3 & 1 & 1 & 1 & 2 & 3 & 3 & 1 & 2 & 3 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ -1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 3 & 1 & 2 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\ 3 & 1 & 2 & 3 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\ 3 & 2 & 3 & 1 & 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 \\ 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 1 & 2 & 3 & 3 & 3 & 2 & 1 & 4 & 2 & 1 & 3 \\ 1 & 2 & 3 & 1 & 3 & 2 & 1 & 3 & 4 & 1 & 3 & 2 \\ 1 & 3 & 1 & 2 & 3 & 1 & 3 & 2 & 4 & 3 & 2 & 1 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 \\ 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 \\ 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ -1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 \\ 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 \\ 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 3 & 1 & 2 & 4 & 3 & 2 & 1 & 1 & 3 & 1 & 2 \\ 3 & 1 & 2 & 3 & 4 & 2 & 1 & 3 & 1 & 1 & 2 & 3 \\ 3 & 2 & 3 & 1 & 4 & 1 & 3 & 2 & 1 & 2 & 3 & 1 \\ 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 1 & 2 & 3 & 3 & 3 & 2 & 1 & 4 & 2 & 3 & 1 \\ 1 & 2 & 3 & 1 & 3 & 2 & 1 & 3 & 4 & 3 & 1 & 2 \\ 1 & 3 & 1 & 2 & 3 & 1 & 3 & 2 & 4 & 1 & 2 & 3 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 & 3 & 2 & 3 & 1 \\ 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 & 3 & 3 & 1 & 2 \\ 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 1 & 2 & 3 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&1&1&1&1\\ -1&1&-1&-1&1&1&-1&-1&1&1&-1&-1\\ -1&-1&-1&1&1&-1&-1&1&1&-1&-1&1\\ -1&-1&1&-1&1&-1&1&-1&1&-1&1&-1\\ 1&1&1&1&1&-1&-1&-1&1&1&1&1\\ 1&-1&-1&1&-1&1&-1&-1&1&-1&1&-1\\ 1&-1&1&-1&-1&-1&-1&1&1&1&-1&-1\\ 1&1&-1&-1&-1&-1&1&-1&1&-1&-1&1\\ 1&1&1&1&1&1&1&1&1&-1&-1&-1\\ 1&1&-1&-1&1&-1&-1&1&-1&-1&1&-1\\ 1&-1&-1&1&1&-1&1&-1&-1&1&-1&-1\\ 1&-1&1&-1&1&1&-1&-1&-1&-1&-1&1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&1&4&4&4\\ 3&1&3&2&4&1&2&3&1&1&3&2\\ 3&3&2&1&4&2&3&1&1&3&2&1\\ 3&2&1&3&4&3&1&2&1&2&1&3\\ 1&4&4&4&1&2&2&2&1&1&1&1\\ 1&3&2&1&3&1&2&3&4&2&1&3\\ 1&2&1&3&3&2&3&1&4&1&3&2\\ 1&1&3&2&3&3&1&2&4&3&2&1\\ 1&1&1&1&1&4&4&4&1&2&2&2\\ 4&1&3&2&1&2&3&1&3&2&1&3\\ 4&3&2&1&1&3&1&2&3&1&3&2\\ 4&2&1&3&1&1&2&3&3&3&2&1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
-1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\
-1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\
-1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\
1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\
1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\
1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\
1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\
1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\
1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\
3 & 1 & 3 & 2 & 4 & 1 & 2 & 3 & 1 & 3 & 1 & 2 \\
3 & 3 & 2 & 1 & 4 & 2 & 3 & 1 & 1 & 1 & 2 & 3 \\
3 & 2 & 1 & 3 & 4 & 3 & 1 & 2 & 1 & 2 & 3 & 1 \\
1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\
1 & 3 & 2 & 1 & 3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 \\
1 & 2 & 1 & 3 & 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 \\
1 & 1 & 3 & 2 & 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 \\
1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\
4 & 1 & 3 & 2 & 1 & 2 & 3 & 1 & 3 & 2 & 3 & 1 \\
4 & 3 & 2 & 1 & 1 & 3 & 1 & 2 & 3 & 3 & 1 & 2 \\
4 & 2 & 1 & 3 & 1 & 1 & 2 & 3 & 3 & 1 & 2 & 3
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1
\end{pmatrix},
$$

$$
P2 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
-1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\
-1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\
-1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\
1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\
1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\
1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\
1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\
1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\
1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\
3 & 1 & 3 & 2 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\
3 & 3 & 2 & 1 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\
3 & 2 & 1 & 3 & 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 \\
1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\
1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 & 4 & 2 & 1 & 3 \\
1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 & 4 & 1 & 3 & 2 \\
1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 & 4 & 3 & 2 & 1 \\
1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\
4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 \\
4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 \\
4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 1 & 3 & 2 & 4 & 3 & 2 & 1 & 1 & 3 & 1 & 2 \\ 3 & 3 & 2 & 1 & 4 & 2 & 1 & 3 & 1 & 1 & 2 & 3 \\ 3 & 2 & 1 & 3 & 4 & 1 & 3 & 2 & 1 & 2 & 3 & 1 \\ 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 \\ 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 & 4 & 2 & 3 & 1 \\ 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 & 4 & 3 & 1 & 2 \\ 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 & 4 & 1 & 2 & 3 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 & 3 & 2 & 3 & 1 \\ 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 & 3 & 3 & 1 & 2 \\ 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 & 3 & 1 & 2 & 3 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$P2=\begin{pmatrix}
1&0&0&0&0&0&0&0&0&0&0&0\\
0&0&0&1&0&0&0&0&0&0&0&0\\
0&0&1&0&0&0&0&0&0&0&0&0\\
0&1&0&0&0&0&0&0&0&0&0&0\\
0&0&0&0&1&0&0&0&0&0&0&0\\
0&0&0&0&0&0&1&0&0&0&0&0\\
0&0&0&0&0&1&0&0&0&0&0&0\\
0&0&0&0&0&0&0&1&0&0&0&0\\
0&0&0&0&0&0&0&0&1&0&0&0\\
0&0&0&0&0&0&0&0&0&1&0&0\\
0&0&0&0&0&0&0&0&0&0&0&1\\
0&0&0&0&0&0&0&0&0&0&1&0
\end{pmatrix},$$

$$H=\begin{pmatrix}
1&-1&-1&-1&1&1&1&1&1&1&1&1\\
-1&1&-1&-1&1&-1&-1&1&1&1&-1&-1\\
-1&-1&-1&1&1&-1&1&-1&1&-1&-1&1\\
-1&-1&1&-1&1&1&-1&-1&1&-1&1&-1\\
1&1&1&1&1&-1&-1&-1&1&1&1&1\\
1&-1&-1&1&-1&-1&-1&1&1&-1&1&-1\\
1&-1&1&-1&-1&-1&1&-1&1&1&-1&-1\\
1&1&-1&-1&-1&1&-1&-1&1&-1&-1&1\\
1&1&1&1&1&1&1&1&1&-1&-1&-1\\
1&-1&-1&1&1&1&-1&-1&-1&1&-1&-1\\
1&-1&1&-1&1&-1&-1&1&-1&-1&-1&1\\
1&1&-1&-1&1&-1&1&-1&-1&-1&1&-1
\end{pmatrix},$$

$$GH=\begin{pmatrix}
1&2&2&2&1&1&1&1&1&4&4&4\\
3&1&3&2&4&3&2&1&1&1&3&2\\
3&3&2&1&4&2&1&3&1&3&2&1\\
3&2&1&3&4&1&3&2&1&2&1&3\\
1&4&4&4&1&2&2&2&1&1&1&1\\
1&3&2&1&3&3&2&1&4&2&1&3\\
1&2&1&3&3&2&1&3&4&1&3&2\\
1&1&3&2&3&1&3&2&4&3&2&1\\
1&1&1&1&1&4&4&4&1&2&2&2\\
4&2&3&1&1&1&2&3&3&1&2&3\\
4&3&1&2&1&2&3&1&3&2&3&1\\
4&1&2&3&1&3&1&2&3&3&1&2
\end{pmatrix}$$

$$P1=\begin{pmatrix}
1&0&0&0&0&0&0&0&0&0&0&0\\
0&1&0&0&0&0&0&0&0&0&0&0\\
0&0&0&1&0&0&0&0&0&0&0&0\\
0&0&1&0&0&0&0&0&0&0&0&0\\
0&0&0&0&0&1&0&0&0&0&0&0\\
0&0&0&0&0&0&1&0&0&0&0&0\\
0&0&0&0&0&0&0&1&0&0&0&0\\
0&0&0&0&1&0&0&0&0&0&0&0\\
0&0&0&0&0&0&0&0&1&0&0&0\\
0&0&0&0&0&0&0&0&0&1&0&0\\
0&0&0&0&0&0&0&0&0&0&0&1\\
0&0&0&0&0&0&0&0&0&0&1&0
\end{pmatrix},$$

$$P2 = \begin{pmatrix}
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0
\end{pmatrix},$$

$$H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 \\
1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\
1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 \\
-1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\
-1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\
1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\
-1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
-1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\
-1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\
1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1
\end{pmatrix},$$

$$GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 2 & 4 & 4 \\
1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 & 3 & 1 & 1 & 2 \\
1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 & 1 & 1 & 4 & 1 \\
3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\
3 & 3 & 1 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\
1 & 4 & 1 & 1 & 3 & 2 & 1 & 3 & 2 & 3 & 1 & 4 \\
3 & 1 & 2 & 1 & 3 & 1 & 4 & 1 & 4 & 4 & 1 & 1 \\
1 & 2 & 2 & 4 & 3 & 4 & 2 & 2 & 1 & 3 & 3 & 1 \\
1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\
2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 1 & 4 \\
2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \\
4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 & 1 & 4 & 3 & 1
\end{pmatrix}$$

$$P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0
\end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 \\
-1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\
1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\
-1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\
-1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 \\
1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\
-1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 \\
-1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \\
1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 \\
1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\
1 & 3 & 1 & 4 & 2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 \\
3 & 3 & 2 & 1 & 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 \\
1 & 4 & 3 & 1 & 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 \\
3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\
3 & 2 & 1 & 1 & 1 & 2 & 3 & 3 & 4 & 1 & 1 & 4 \\
1 & 1 & 4 & 1 & 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 \\
1 & 2 & 2 & 4 & 3 & 2 & 4 & 2 & 3 & 3 & 1 & 1 \\
2 & 1 & 2 & 1 & 3 & 3 & 1 & 4 & 1 & 1 & 1 & 2 \\
2 & 3 & 1 & 4 & 1 & 4 & 1 & 1 & 3 & 2 & 1 & 3 \\
4 & 4 & 1 & 1 & 3 & 1 & 2 & 1 & 3 & 1 & 4 & 1 \\
1 & 3 & 3 & 1 & 1 & 2 & 2 & 4 & 3 & 4 & 2 & 2
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&1&1&1&1\\ 1&-1&1&1&1&1&-1&-1&1&1&-1&-1\\ -1&-1&-1&1&1&-1&-1&1&1&-1&-1&1\\ 1&1&-1&1&1&-1&1&-1&1&-1&1&-1\\ -1&1&-1&1&1&1&1&-1&-1&1&-1&1\\ -1&-1&1&1&-1&-1&1&-1&1&1&1&1\\ 1&1&1&1&-1&1&1&1&1&-1&-1&1\\ 1&-1&-1&1&-1&1&-1&-1&-1&-1&1&1\\ -1&1&1&-1&1&1&-1&-1&1&-1&1&1\\ 1&-1&1&-1&1&-1&1&-1&-1&-1&-1&1\\ 1&1&1&1&1&-1&-1&1&-1&1&1&1\\ -1&-1&1&1&1&1&1&1&-1&-1&1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&1&4&4&4\\ 1&3&1&4&4&1&2&3&1&1&3&2\\ 3&3&2&1&4&2&3&1&1&3&2&1\\ 1&4&3&1&4&3&1&2&1&2&1&3\\ 3&1&3&4&1&1&1&2&2&1&2&1\\ 3&2&1&1&3&2&1&3&4&1&1&4\\ 1&1&4&1&3&1&4&1&4&2&3&1\\ 1&2&2&4&3&4&2&2&3&3&1&1\\ 2&1&1&2&1&4&3&3&1&2&1&1\\ 1&3&1&3&1&2&4&2&3&2&2&4\\ 4&4&1&1&1&3&2&1&3&1&4&1\\ 2&3&4&1&1&1&1&4&3&3&1&2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&1&0&0 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 \\
1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\
-1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 \\
1 & 1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\
-1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\
-1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\
1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\
-1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\
1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 \\
1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\
-1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 2 & 4 & 4 \\
1 & 3 & 1 & 4 & 4 & 1 & 2 & 3 & 3 & 1 & 1 & 2 \\
3 & 3 & 2 & 1 & 4 & 2 & 3 & 1 & 1 & 1 & 4 & 1 \\
1 & 4 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\
3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\
3 & 2 & 1 & 1 & 3 & 2 & 1 & 3 & 2 & 3 & 1 & 4 \\
1 & 1 & 4 & 1 & 3 & 1 & 4 & 1 & 4 & 4 & 1 & 1 \\
1 & 2 & 2 & 4 & 3 & 4 & 2 & 2 & 1 & 3 & 3 & 1 \\
2 & 1 & 1 & 2 & 1 & 4 & 3 & 3 & 1 & 2 & 1 & 1 \\
1 & 3 & 1 & 3 & 1 & 2 & 4 & 2 & 1 & 4 & 2 & 4 \\
4 & 4 & 1 & 1 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \\
2 & 3 & 4 & 1 & 1 & 1 & 1 & 4 & 1 & 3 & 3 & 2
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&1&1&1&1\\ 1&-1&1&1&-1&1&1&-1&1&1&-1&-1\\ -1&-1&-1&1&-1&1&-1&1&1&-1&-1&1\\ 1&1&-1&1&1&1&-1&-1&1&-1&1&-1\\ -1&1&-1&1&1&1&1&-1&-1&1&-1&1\\ -1&-1&1&1&1&-1&-1&-1&1&1&1&1\\ 1&1&1&1&1&-1&1&1&1&-1&-1&1\\ 1&-1&-1&1&-1&-1&1&-1&-1&-1&1&1\\ -1&1&1&-1&-1&1&1&-1&1&-1&1&1\\ 1&-1&1&-1&1&1&-1&-1&-1&-1&-1&1\\ 1&1&1&1&-1&1&-1&1&-1&1&1&1\\ -1&-1&1&1&1&1&1&1&-1&-1&1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&1&4&4&4\\ 1&3&1&4&2&1&4&3&1&1&3&2\\ 3&3&2&1&2&4&3&1&1&3&2&1\\ 1&4&3&1&4&1&3&2&1&2&1&3\\ 3&1&3&4&1&1&1&2&2&1&2&1\\ 3&2&1&1&1&2&3&3&4&1&1&4\\ 1&1&4&1&1&3&4&1&4&2&3&1\\ 1&2&2&4&3&2&4&2&3&3&1&1\\ 2&1&1&2&3&4&1&3&1&2&1&1\\ 1&3&1&3&1&4&2&2&3&2&2&4\\ 4&4&1&1&3&1&2&1&3&1&4&1\\ 2&3&4&1&1&1&1&4&3&3&1&2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&1&0&0 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 \\
1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 \\
-1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 \\
1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\
-1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\
-1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & 1 \\
1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\
-1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 \\
1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 \\
1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 \\
-1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 2 & 4 & 4 \\
1 & 3 & 1 & 4 & 2 & 1 & 4 & 3 & 3 & 1 & 1 & 2 \\
3 & 3 & 2 & 1 & 2 & 4 & 3 & 1 & 1 & 1 & 4 & 1 \\
1 & 4 & 3 & 1 & 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 \\
3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\
3 & 2 & 1 & 1 & 1 & 2 & 3 & 3 & 2 & 3 & 1 & 4 \\
1 & 1 & 4 & 1 & 1 & 3 & 4 & 1 & 4 & 4 & 1 & 1 \\
1 & 2 & 2 & 4 & 3 & 2 & 4 & 2 & 1 & 3 & 3 & 1 \\
2 & 1 & 1 & 2 & 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 \\
1 & 3 & 1 & 3 & 1 & 4 & 2 & 2 & 1 & 4 & 2 & 4 \\
4 & 4 & 1 & 1 & 3 & 1 & 2 & 1 & 3 & 3 & 2 & 1 \\
2 & 3 & 4 & 1 & 1 & 1 & 1 & 4 & 1 & 3 & 3 & 2
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 \\ 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 \\ 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\ 3 & 3 & 1 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\ 1 & 4 & 1 & 1 & 3 & 2 & 1 & 3 & 4 & 1 & 1 & 4 \\ 3 & 1 & 2 & 1 & 3 & 1 & 4 & 1 & 4 & 2 & 3 & 1 \\ 1 & 2 & 2 & 4 & 3 & 4 & 2 & 2 & 3 & 3 & 1 & 1 \\ 2 & 1 & 1 & 2 & 1 & 4 & 3 & 3 & 1 & 2 & 1 & 1 \\ 1 & 1 & 3 & 3 & 1 & 2 & 4 & 2 & 3 & 2 & 2 & 4 \\ 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 1 & 4 & 1 \\ 4 & 1 & 4 & 1 & 1 & 1 & 1 & 4 & 3 & 3 & 1 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\ -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 2 & 4 & 4 \\ 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 & 3 & 1 & 1 & 2 \\ 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 & 1 & 1 & 4 & 1 \\ 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\ 3 & 3 & 1 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\ 1 & 4 & 1 & 1 & 3 & 2 & 1 & 3 & 2 & 3 & 1 & 4 \\ 3 & 1 & 2 & 1 & 3 & 1 & 4 & 1 & 4 & 4 & 1 & 1 \\ 1 & 2 & 2 & 4 & 3 & 4 & 2 & 2 & 1 & 3 & 3 & 1 \\ 2 & 1 & 1 & 2 & 1 & 4 & 3 & 3 & 1 & 2 & 1 & 1 \\ 1 & 1 & 3 & 3 & 1 & 2 & 4 & 2 & 1 & 4 & 2 & 4 \\ 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \\ 4 & 1 & 4 & 1 & 1 & 1 & 1 & 4 & 1 & 3 & 3 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\ -1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 \\ -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 1 & 1 & 3 & 4 & 2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 \\ 1 & 3 & 4 & 1 & 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 \\ 3 & 2 & 3 & 1 & 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 \\ 3 & 3 & 1 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\ 1 & 4 & 1 & 1 & 1 & 2 & 3 & 3 & 4 & 1 & 1 & 4 \\ 3 & 1 & 2 & 1 & 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 \\ 1 & 2 & 2 & 4 & 3 & 2 & 4 & 2 & 3 & 3 & 1 & 1 \\ 2 & 1 & 1 & 2 & 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 \\ 1 & 1 & 3 & 3 & 1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 \\ 2 & 4 & 3 & 1 & 3 & 1 & 2 & 1 & 3 & 1 & 4 & 1 \\ 4 & 1 & 4 & 1 & 1 & 1 & 1 & 4 & 3 & 3 & 1 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0&0&1&0&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&1&0&0&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&-1&-1&1&1\\ 1&1&-1&1&-1&1&1&-1&-1&1&1&-1\\ 1&-1&1&1&-1&1&-1&1&1&1&1&1\\ -1&-1&-1&1&1&1&-1&-1&1&-1&1&-1\\ -1&-1&1&1&1&1&1&-1&-1&1&-1&1\\ 1&1&1&1&1&-1&-1&-1&-1&-1&1&1\\ -1&1&-1&1&1&-1&1&1&1&1&1&1\\ 1&-1&-1&1&-1&-1&1&-1&1&-1&-1&1\\ -1&1&1&-1&-1&1&1&-1&1&-1&1&1\\ 1&1&-1&-1&1&1&-1&-1&1&1&-1&1\\ -1&1&-1&1&-1&1&-1&1&-1&-1&-1&1\\ 1&1&1&1&1&1&1&1&1&-1&-1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&3&2&4&4\\ 1&1&3&4&2&1&4&3&3&1&1&2\\ 1&3&4&1&2&4&3&1&1&1&4&1\\ 3&2&3&1&4&1&3&2&1&2&1&3\\ 3&3&1&4&1&1&1&2&2&1&2&1\\ 1&4&1&1&1&2&3&3&2&3&1&4\\ 3&1&2&1&1&3&4&1&4&4&1&1\\ 1&2&2&4&3&2&4&2&1&3&3&1\\ 2&1&1&2&3&4&1&3&1&2&1&1\\ 1&1&3&3&1&4&2&2&1&4&2&4\\ 2&4&3&1&3&1&2&1&3&3&2&1\\ 4&1&4&1&1&1&1&4&1&3&3&2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 \\
-1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\
1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\
1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 \\
-1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\
1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\
1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\
-1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\
-1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\
-1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 4 & 4 & 2 \\
3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 \\
1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 & 3 & 1 & 2 & 1 \\
1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 & 1 & 4 & 1 & 1 \\
3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\
1 & 1 & 4 & 1 & 3 & 1 & 2 & 3 & 2 & 4 & 1 & 3 \\
1 & 2 & 2 & 4 & 3 & 2 & 4 & 2 & 1 & 1 & 3 & 3 \\
3 & 2 & 1 & 1 & 3 & 4 & 1 & 1 & 4 & 1 & 1 & 4 \\
1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\
4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 & 1 & 3 & 1 & 4 \\
2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 & 1 & 1 & 4 & 3 \\
2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 \\ -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\ 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ -1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\ -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 4 & 4 & 2 \\ 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 \\ 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 & 3 & 1 & 2 & 1 \\ 1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 & 1 & 4 & 1 & 1 \\ 3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 & 2 & 1 & 2 & 1 \\ 1 & 1 & 4 & 1 & 3 & 1 & 2 & 3 & 2 & 4 & 1 & 3 \\ 1 & 2 & 2 & 4 & 3 & 2 & 4 & 2 & 1 & 1 & 3 & 3 \\ 3 & 2 & 1 & 1 & 3 & 4 & 1 & 1 & 4 & 1 & 1 & 4 \\ 2 & 1 & 2 & 1 & 1 & 3 & 3 & 4 & 1 & 1 & 1 & 2 \\ 4 & 4 & 1 & 1 & 1 & 1 & 4 & 1 & 1 & 3 & 2 & 3 \\ 1 & 3 & 3 & 1 & 1 & 4 & 2 & 2 & 1 & 2 & 4 & 4 \\ 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 2 & 4 & 4 \\ 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 & 3 & 1 & 1 & 2 \\ 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 & 1 & 1 & 4 & 1 \\ 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\ 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\ 1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 & 1 & 3 & 1 & 3 \\ 3 & 1 & 2 & 1 & 3 & 1 & 4 & 1 & 4 & 4 & 1 & 1 \\ 1 & 1 & 1 & 4 & 3 & 3 & 1 & 2 & 2 & 3 & 4 & 1 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 1 & 4 \\ 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \\ 4 & 1 & 3 & 2 & 1 & 2 & 1 & 3 & 1 & 4 & 3 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 2 & 4 & 4 \\ 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 & 3 & 1 & 1 & 2 \\ 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 & 1 & 1 & 4 & 1 \\ 3 & 2 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\ 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\ 1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 & 1 & 3 & 1 & 3 \\ 3 & 1 & 2 & 1 & 3 & 1 & 4 & 1 & 4 & 4 & 1 & 1 \\ 1 & 1 & 1 & 4 & 3 & 3 & 1 & 2 & 2 & 3 & 4 & 1 \\ 2 & 1 & 1 & 2 & 1 & 4 & 3 & 3 & 1 & 2 & 1 & 1 \\ 1 & 1 & 3 & 3 & 1 & 2 & 4 & 2 & 1 & 4 & 2 & 4 \\ 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 & 3 & 3 & 2 & 1 \\ 4 & 1 & 4 & 1 & 1 & 1 & 1 & 4 & 1 & 3 & 3 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&-1&1&-1&1\\ 1&1&-1&1&1&1&-1&-1&1&1&1&1\\ -1&1&-1&-1&1&-1&-1&1&1&-1&-1&1\\ 1&1&1&-1&1&-1&1&-1&-1&-1&1&1\\ -1&1&-1&1&1&-1&1&1&-1&1&1&-1\\ -1&1&1&-1&-1&1&1&1&1&1&1&1\\ 1&1&-1&-1&-1&-1&1&-1&1&1&-1&-1\\ 1&1&1&1&-1&-1&-1&1&-1&1&-1&1\\ 1&1&1&1&1&1&1&1&1&-1&-1&-1\\ -1&1&1&-1&1&1&-1&-1&-1&1&-1&-1\\ 1&-1&1&-1&1&-1&-1&1&1&1&1&-1\\ -1&-1&1&1&1&-1&1&-1&1&1&-1&1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&3&4&2&4\\ 1&1&3&4&4&1&2&3&1&1&1&4\\ 3&1&2&3&4&2&3&1&1&3&2&1\\ 1&4&1&3&4&3&1&2&3&2&1&1\\ 3&4&3&1&1&2&1&1&2&1&1&2\\ 3&1&1&2&3&1&1&4&4&1&4&1\\ 1&4&2&2&3&2&4&2&1&1&3&3\\ 1&1&4&1&3&3&2&1&2&4&3&1\\ 1&1&1&1&1&4&4&4&1&2&2&2\\ 2&1&4&3&1&1&3&2&3&1&3&2\\ 4&2&1&3&1&3&2&1&1&1&4&3\\ 2&3&1&4&1&2&1&3&1&4&3&1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 \\ -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 1 & 3 & 2 & 2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 \\ 1 & 1 & 4 & 3 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\ 1 & 4 & 3 & 1 & 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 \\ 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\ 1 & 1 & 1 & 4 & 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 \\ 1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 & 3 & 1 & 3 & 1 \\ 3 & 1 & 2 & 1 & 1 & 3 & 2 & 3 & 4 & 4 & 1 & 1 \\ 2 & 1 & 1 & 2 & 3 & 4 & 3 & 1 & 1 & 2 & 1 & 1 \\ 4 & 1 & 4 & 1 & 3 & 1 & 1 & 2 & 3 & 1 & 1 & 4 \\ 1 & 1 & 3 & 3 & 1 & 4 & 2 & 2 & 3 & 2 & 4 & 2 \\ 2 & 4 & 3 & 1 & 1 & 1 & 4 & 1 & 3 & 3 & 2 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 \\ -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 \\ -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 1 & 3 & 2 & 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 \\ 1 & 1 & 4 & 3 & 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 \\ 1 & 4 & 3 & 1 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\ 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\ 1 & 1 & 1 & 4 & 3 & 1 & 1 & 4 & 4 & 1 & 2 & 3 \\ 1 & 4 & 2 & 2 & 3 & 2 & 4 & 2 & 3 & 1 & 3 & 1 \\ 3 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 4 & 4 & 1 & 1 \\ 2 & 2 & 1 & 1 & 1 & 3 & 4 & 3 & 1 & 1 & 2 & 1 \\ 4 & 1 & 4 & 1 & 1 & 1 & 3 & 2 & 3 & 1 & 1 & 4 \\ 2 & 1 & 3 & 4 & 1 & 4 & 1 & 1 & 3 & 2 & 3 & 1 \\ 1 & 3 & 3 & 1 & 1 & 2 & 2 & 4 & 3 & 4 & 2 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 \\ -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & -1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\ -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 4 & 2 & 4 \\ 3 & 1 & 3 & 2 & 4 & 1 & 2 & 3 & 1 & 1 & 1 & 4 \\ 1 & 1 & 4 & 3 & 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 \\ 1 & 4 & 3 & 1 & 4 & 3 & 1 & 2 & 3 & 2 & 1 & 1 \\ 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\ 1 & 1 & 1 & 4 & 3 & 1 & 1 & 4 & 4 & 1 & 4 & 1 \\ 1 & 4 & 2 & 2 & 3 & 2 & 4 & 2 & 1 & 1 & 3 & 3 \\ 3 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 2 & 4 & 3 & 1 \\ 2 & 2 & 1 & 1 & 1 & 3 & 4 & 3 & 1 & 1 & 2 & 1 \\ 4 & 1 & 4 & 1 & 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 \\ 2 & 1 & 3 & 4 & 1 & 4 & 1 & 1 & 1 & 2 & 3 & 3 \\ 1 & 3 & 3 & 1 & 1 & 2 & 2 & 4 & 1 & 4 & 4 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 \\ -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 \\ 1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 1 & 3 & 2 & 2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 \\ 1 & 1 & 4 & 3 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\ 1 & 4 & 3 & 1 & 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 \\ 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\ 1 & 1 & 1 & 4 & 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 \\ 1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 & 3 & 1 & 3 & 1 \\ 3 & 1 & 2 & 1 & 1 & 3 & 2 & 3 & 4 & 4 & 1 & 1 \\ 2 & 2 & 1 & 1 & 3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 \\ 4 & 1 & 4 & 1 & 3 & 1 & 1 & 2 & 3 & 1 & 1 & 4 \\ 2 & 1 & 3 & 4 & 1 & 4 & 1 & 1 & 3 & 2 & 3 & 1 \\ 1 & 3 & 3 & 1 & 1 & 2 & 4 & 2 & 3 & 4 & 2 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 \\ -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 \\ -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 \\ -1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 4 & 2 & 4 \\ 3 & 1 & 3 & 2 & 2 & 1 & 4 & 3 & 1 & 1 & 1 & 4 \\ 1 & 1 & 4 & 3 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\ 1 & 4 & 3 & 1 & 2 & 3 & 1 & 4 & 3 & 2 & 1 & 1 \\ 3 & 4 & 1 & 3 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\ 1 & 1 & 1 & 4 & 1 & 1 & 3 & 4 & 4 & 1 & 4 & 1 \\ 1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 & 1 & 1 & 3 & 3 \\ 3 & 1 & 2 & 1 & 1 & 3 & 2 & 3 & 2 & 4 & 3 & 1 \\ 2 & 2 & 1 & 1 & 3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 \\ 4 & 1 & 4 & 1 & 3 & 1 & 1 & 2 & 3 & 1 & 3 & 2 \\ 2 & 1 & 3 & 4 & 1 & 4 & 1 & 1 & 1 & 2 & 3 & 3 \\ 1 & 3 & 3 & 1 & 1 & 2 & 4 & 2 & 1 & 4 & 4 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\
-1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\
1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\
-1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\
-1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 \\
1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 \\
1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 \\
-1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 \\
-1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 \\
1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\
1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 \\
3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 \\
1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\
3 & 4 & 3 & 1 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\
3 & 1 & 1 & 2 & 3 & 1 & 1 & 4 & 4 & 1 & 2 & 3 \\
1 & 4 & 2 & 2 & 3 & 2 & 4 & 2 & 3 & 1 & 3 & 1 \\
1 & 1 & 4 & 1 & 3 & 3 & 2 & 1 & 4 & 4 & 1 & 1 \\
2 & 2 & 1 & 1 & 1 & 3 & 4 & 3 & 1 & 1 & 2 & 1 \\
2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 & 3 & 1 & 1 & 4 \\
4 & 1 & 1 & 4 & 1 & 4 & 1 & 1 & 3 & 2 & 3 & 1 \\
1 & 3 & 1 & 3 & 1 & 2 & 2 & 4 & 3 & 4 & 2 & 2
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&-1&1&-1&1\\ 1&1&-1&1&1&1&-1&-1&1&1&1&1\\ -1&1&-1&-1&1&-1&-1&1&1&-1&-1&1\\ 1&1&1&-1&1&-1&1&-1&-1&-1&1&1\\ -1&1&-1&1&1&-1&1&1&-1&1&1&-1\\ -1&1&1&-1&-1&1&1&1&1&1&1&1\\ 1&1&-1&-1&-1&-1&1&-1&1&1&-1&-1\\ 1&1&1&1&-1&-1&-1&1&-1&1&-1&1\\ -1&-1&1&1&1&-1&1&-1&1&1&-1&1\\ -1&1&1&-1&1&1&-1&-1&-1&1&-1&-1\\ 1&1&1&1&1&1&1&1&1&-1&-1&-1\\ 1&-1&1&-1&1&-1&-1&1&1&1&1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&3&4&2&4\\ 1&1&3&4&4&1&2&3&1&1&1&4\\ 3&1&2&3&4&2&3&1&1&3&2&1\\ 1&4&1&3&4&3&1&2&3&2&1&1\\ 3&4&3&1&1&2&1&1&2&1&1&2\\ 3&1&1&2&3&1&1&4&4&1&4&1\\ 1&4&2&2&3&2&4&2&1&1&3&3\\ 1&1&4&1&3&3&2&1&2&4&3&1\\ 2&2&1&1&1&3&4&3&1&1&2&1\\ 2&1&4&3&1&1&3&2&3&1&3&2\\ 4&1&1&4&1&4&1&1&1&2&3&3\\ 1&3&1&3&1&2&2&4&1&4&4&2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0\\ 0&0&0&0&0&0&0&0&1&0&0&0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 \\ -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 \\ -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 \\ 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 1 & 1 & 3 & 4 & 2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 \\ 3 & 1 & 2 & 3 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\ 1 & 4 & 1 & 3 & 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 \\ 3 & 4 & 3 & 1 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\ 3 & 1 & 1 & 2 & 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 \\ 1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 & 3 & 1 & 3 & 1 \\ 1 & 1 & 4 & 1 & 1 & 3 & 2 & 3 & 4 & 4 & 1 & 1 \\ 2 & 2 & 1 & 1 & 3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 \\ 2 & 1 & 4 & 3 & 3 & 1 & 1 & 2 & 3 & 1 & 1 & 4 \\ 4 & 1 & 1 & 4 & 1 & 4 & 1 & 1 & 3 & 2 & 3 & 1 \\ 1 & 3 & 1 & 3 & 1 & 2 & 4 & 2 & 3 & 4 & 2 & 2 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 \\
1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 \\
-1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\
1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 \\
-1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 \\
-1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 \\
1 & 1 & -1 & -1 & -1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\
1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 \\
-1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 \\
-1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 4 & 2 & 4 \\
1 & 1 & 3 & 4 & 2 & 1 & 4 & 3 & 1 & 1 & 1 & 4 \\
3 & 1 & 2 & 3 & 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 \\
1 & 4 & 1 & 3 & 2 & 3 & 1 & 4 & 3 & 2 & 1 & 1 \\
3 & 4 & 3 & 1 & 1 & 2 & 1 & 1 & 2 & 1 & 1 & 2 \\
3 & 1 & 1 & 2 & 1 & 1 & 3 & 4 & 4 & 1 & 4 & 1 \\
1 & 4 & 2 & 2 & 3 & 2 & 2 & 4 & 1 & 1 & 3 & 3 \\
1 & 1 & 4 & 1 & 1 & 3 & 2 & 3 & 2 & 4 & 3 & 1 \\
2 & 2 & 1 & 1 & 3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 \\
2 & 1 & 4 & 3 & 3 & 1 & 1 & 2 & 3 & 1 & 3 & 2 \\
4 & 1 & 1 & 4 & 1 & 4 & 1 & 1 & 1 & 2 & 3 & 3 \\
1 & 3 & 1 & 3 & 1 & 2 & 4 & 2 & 1 & 4 & 4 & 2
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0&1&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0&0&0&0&0 \\ 1&0&0&0&0&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&1&0&0&0&0&0&0&0 \\ 0&0&0&0&0&1&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&1&0&0&0&0 \\ 0&0&0&0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&1 \\ 0&0&0&0&0&0&0&0&1&0&0&0 \\ 0&0&0&0&0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&-1&1&1&-1 \\ -1&-1&1&-1&1&1&-1&-1&1&1&-1&-1 \\ 1&-1&1&1&1&-1&-1&1&-1&1&-1&1 \\ 1&1&1&-1&1&-1&1&-1&1&1&1&1 \\ -1&1&1&-1&1&1&-1&1&-1&-1&1&1 \\ 1&-1&1&-1&-1&-1&-1&1&1&-1&1&-1 \\ 1&1&1&1&-1&1&-1&-1&-1&1&1&-1 \\ -1&-1&1&1&-1&1&1&1&1&1&1&1 \\ 1&1&1&1&1&1&1&1&1&-1&-1&-1 \\ 1&-1&-1&1&1&1&-1&-1&1&-1&1&1 \\ -1&1&-1&1&1&-1&-1&1&1&1&1&-1 \\ -1&-1&1&1&1&-1&1&-1&-1&-1&1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&3&4&4&2 \\ 3&3&1&2&4&1&2&3&1&1&3&2 \\ 1&3&4&1&4&2&3&1&3&1&2&1 \\ 1&4&1&3&4&3&1&2&1&4&1&1 \\ 3&1&4&3&1&1&2&1&2&2&1&1 \\ 1&2&4&2&3&2&2&4&1&3&1&3 \\ 1&1&1&4&3&1&3&2&2&1&4&3 \\ 3&2&1&1&3&4&1&1&4&1&1&4 \\ 1&1&1&1&1&4&4&4&1&2&2&2 \\ 4&3&2&1&1&1&3&2&1&3&1&4 \\ 2&4&3&1&1&3&2&1&1&1&4&3 \\ 2&3&1&4&1&2&1&3&3&2&1&3 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0 \\ 0&1&0&0&0&0&0&0&0&0&0&0 \\ 0&0&0&1&0&0&0&0&0&0&0&0 \\ 0&0&1&0&0&0&0&0&0&0&0&0 \\ 0&0&0&0&0&0&0&1&0&0&0&0 \\ 0&0&0&0&1&0&0&0&0&0&0&0 \\ 0&0&0&0&0&1&0&0&0&0&0&0 \\ 0&0&0&0&0&0&1&0&0&0&0&0 \\ 0&0&0&0&0&0&0&0&0&1&0&0 \\ 0&0&0&0&0&0&0&0&0&0&0&1 \\ 0&0&0&0&0&0&0&0&1&0&0&0 \\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 \\ 1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 3 & 1 & 2 & 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 \\ 1 & 3 & 4 & 1 & 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 \\ 1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\ 3 & 1 & 4 & 3 & 1 & 1 & 2 & 1 & 2 & 2 & 1 & 1 \\ 1 & 2 & 4 & 2 & 3 & 2 & 2 & 4 & 3 & 1 & 1 & 3 \\ 1 & 1 & 1 & 4 & 3 & 1 & 3 & 2 & 4 & 1 & 4 & 1 \\ 3 & 2 & 1 & 1 & 3 & 4 & 1 & 1 & 4 & 3 & 1 & 2 \\ 2 & 1 & 2 & 1 & 1 & 3 & 3 & 4 & 1 & 1 & 1 & 2 \\ 4 & 4 & 1 & 1 & 1 & 1 & 4 & 1 & 3 & 1 & 2 & 3 \\ 1 & 3 & 3 & 1 & 1 & 4 & 2 & 2 & 3 & 2 & 4 & 2 \\ 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 & 3 & 4 & 1 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&-1&1&1&-1\\ -1&-1&1&-1&1&1&-1&-1&1&1&-1&-1\\ 1&-1&1&1&1&-1&-1&1&-1&1&-1&1\\ 1&1&1&-1&1&-1&1&-1&1&1&1&1\\ -1&1&1&-1&1&1&-1&1&-1&-1&1&1\\ 1&-1&1&-1&-1&-1&-1&1&1&-1&1&-1\\ 1&1&1&1&-1&1&-1&-1&-1&1&1&-1\\ -1&-1&1&1&-1&1&1&1&1&1&1&1\\ -1&1&-1&1&1&-1&-1&1&1&1&1&-1\\ 1&1&1&1&1&1&1&1&1&-1&-1&-1\\ 1&-1&-1&1&1&1&-1&-1&1&-1&1&1\\ -1&-1&1&1&1&-1&1&-1&-1&-1&1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&3&4&4&2\\ 3&3&1&2&4&1&2&3&1&1&3&2\\ 1&3&4&1&4&2&3&1&3&1&2&1\\ 1&4&1&3&4&3&1&2&1&4&1&1\\ 3&1&4&3&1&1&2&1&2&2&1&1\\ 1&2&4&2&3&2&2&4&1&3&1&3\\ 1&1&1&4&3&1&3&2&2&1&4&3\\ 3&2&1&1&3&4&1&1&4&1&1&4\\ 2&1&2&1&1&3&3&4&1&1&1&2\\ 4&4&1&1&1&1&4&1&1&3&2&3\\ 1&3&3&1&1&4&2&2&1&2&4&4\\ 2&3&1&4&1&2&1&3&3&2&1&3 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ 1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 \\ 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ -1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 3 & 3 & 1 & 2 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\ 1 & 3 & 4 & 1 & 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 \\ 1 & 4 & 1 & 3 & 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 \\ 3 & 1 & 4 & 3 & 1 & 1 & 2 & 1 & 2 & 2 & 1 & 1 \\ 1 & 2 & 4 & 2 & 3 & 4 & 2 & 2 & 3 & 1 & 1 & 3 \\ 1 & 1 & 1 & 4 & 1 & 3 & 3 & 2 & 4 & 1 & 4 & 1 \\ 3 & 2 & 1 & 1 & 1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 \\ 2 & 1 & 2 & 1 & 3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 \\ 4 & 4 & 1 & 1 & 1 & 1 & 4 & 1 & 3 & 1 & 2 & 3 \\ 1 & 3 & 3 & 1 & 1 & 2 & 2 & 4 & 3 & 2 & 4 & 2 \\ 2 & 3 & 1 & 4 & 3 & 2 & 1 & 1 & 3 & 4 & 1 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 \\
-1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\
1 & -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 \\
1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 \\
-1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 \\
1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 \\
1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 & 1 & 1 & -1 \\
-1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 \\
-1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 \\
-1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 4 & 4 & 2 \\
3 & 3 & 1 & 2 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\
1 & 3 & 4 & 1 & 2 & 4 & 3 & 1 & 3 & 1 & 2 & 1 \\
1 & 4 & 1 & 3 & 2 & 3 & 1 & 4 & 1 & 4 & 1 & 1 \\
3 & 1 & 4 & 3 & 1 & 1 & 2 & 1 & 2 & 2 & 1 & 1 \\
1 & 2 & 4 & 2 & 3 & 4 & 2 & 2 & 1 & 3 & 1 & 3 \\
1 & 1 & 1 & 4 & 1 & 3 & 3 & 2 & 2 & 1 & 4 & 3 \\
3 & 2 & 1 & 1 & 1 & 4 & 1 & 3 & 4 & 1 & 1 & 4 \\
2 & 1 & 2 & 1 & 3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 \\
4 & 4 & 1 & 1 & 1 & 1 & 4 & 1 & 1 & 3 & 2 & 3 \\
1 & 3 & 3 & 1 & 1 & 2 & 2 & 4 & 1 & 2 & 4 & 4 \\
2 & 3 & 1 & 4 & 3 & 2 & 1 & 1 & 3 & 2 & 1 & 3
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ -1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 \\ 1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 \\ -1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \\ 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & -1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 1 & 3 & 1 & 4 & 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 \\ 1 & 1 & 4 & 3 & 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 \\ 3 & 2 & 1 & 3 & 4 & 3 & 1 & 2 & 1 & 2 & 1 & 3 \\ 3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 & 2 & 2 & 1 & 1 \\ 1 & 2 & 4 & 2 & 3 & 2 & 2 & 4 & 3 & 1 & 1 & 3 \\ 3 & 1 & 1 & 2 & 3 & 1 & 3 & 2 & 4 & 1 & 4 & 1 \\ 1 & 4 & 1 & 1 & 3 & 4 & 1 & 1 & 4 & 3 & 1 & 2 \\ 2 & 1 & 2 & 1 & 1 & 3 & 3 & 4 & 1 & 1 & 1 & 2 \\ 2 & 4 & 1 & 3 & 1 & 1 & 4 & 1 & 3 & 1 & 2 & 3 \\ 1 & 1 & 3 & 3 & 1 & 4 & 2 & 2 & 3 & 2 & 4 & 2 \\ 4 & 1 & 1 & 4 & 1 & 2 & 1 & 3 & 3 & 4 & 1 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix}
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},$$

$$H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 \\
1 & -1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\
1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\
-1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 \\
-1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 \\
1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\
-1 & 1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\
1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
-1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\
-1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\
1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 \\
1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & -1
\end{pmatrix},$$

$$GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 4 & 4 & 2 \\
1 & 3 & 1 & 4 & 4 & 1 & 2 & 3 & 1 & 1 & 3 & 2 \\
1 & 1 & 4 & 3 & 4 & 2 & 3 & 1 & 3 & 1 & 2 & 1 \\
3 & 2 & 1 & 3 & 4 & 3 & 1 & 2 & 1 & 4 & 1 & 1 \\
3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 & 2 & 2 & 1 & 1 \\
1 & 2 & 4 & 2 & 3 & 2 & 2 & 4 & 1 & 3 & 1 & 3 \\
3 & 1 & 1 & 2 & 3 & 1 & 3 & 2 & 2 & 1 & 4 & 3 \\
1 & 4 & 1 & 1 & 3 & 4 & 1 & 1 & 4 & 1 & 1 & 4 \\
2 & 1 & 2 & 1 & 1 & 3 & 3 & 4 & 1 & 1 & 1 & 2 \\
2 & 4 & 1 & 3 & 1 & 1 & 4 & 1 & 1 & 3 & 2 & 3 \\
1 & 1 & 3 & 3 & 1 & 4 & 2 & 2 & 1 & 2 & 4 & 4 \\
4 & 1 & 1 & 4 & 1 & 2 & 1 & 3 & 3 & 2 & 1 & 3
\end{pmatrix}$$

$$P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},$$

$$
P2 = \begin{pmatrix}
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$
H = \begin{pmatrix}
1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\
1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\
-1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\
-1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 \\
1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\
-1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 \\
-1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 \\
-1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \\
1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 \\
1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 & 1
\end{pmatrix},
$$

$$
GH = \begin{pmatrix}
1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\
1 & 3 & 1 & 4 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\
1 & 1 & 4 & 3 & 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 \\
3 & 2 & 1 & 3 & 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 \\
3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 & 2 & 2 & 1 & 1 \\
1 & 2 & 4 & 2 & 3 & 4 & 2 & 2 & 3 & 1 & 1 & 3 \\
3 & 1 & 1 & 2 & 1 & 3 & 3 & 2 & 4 & 1 & 4 & 1 \\
1 & 4 & 1 & 1 & 1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 \\
2 & 1 & 2 & 1 & 3 & 1 & 3 & 4 & 1 & 1 & 1 & 2 \\
2 & 4 & 1 & 3 & 1 & 1 & 4 & 1 & 3 & 1 & 2 & 3 \\
1 & 1 & 3 & 3 & 1 & 2 & 2 & 4 & 3 & 2 & 4 & 2 \\
4 & 1 & 1 & 4 & 3 & 2 & 1 & 1 & 3 & 4 & 1 & 1
\end{pmatrix}
$$

$$
P1 = \begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0
\end{pmatrix},
$$

$$P2 = \begin{pmatrix} 0&0&0&1&0&0&0&0&0&0&0&0\\ 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1&-1&-1&-1&1&1&1&1&-1&1&1&-1\\ 1&-1&1&1&1&-1&-1&1&1&1&-1&-1\\ 1&1&1&-1&-1&1&-1&1&-1&1&-1&1\\ -1&-1&1&-1&-1&-1&1&1&1&1&1&1\\ -1&-1&1&1&1&1&-1&1&-1&-1&1&1\\ 1&-1&1&-1&-1&1&-1&-1&1&-1&1&-1\\ -1&1&1&-1&1&-1&-1&-1&-1&1&1&-1\\ 1&1&1&1&1&1&1&-1&1&1&1&1\\ -1&1&-1&1&-1&1&-1&1&1&1&1&-1\\ -1&1&1&-1&1&1&1&1&1&-1&-1&-1\\ 1&1&-1&-1&1&-1&-1&1&1&-1&1&1\\ 1&1&1&1&-1&-1&1&1&-1&-1&1&-1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1&2&2&2&1&1&1&1&3&4&4&2\\ 1&3&1&4&4&3&2&1&1&1&3&2\\ 1&1&4&3&2&4&3&1&3&1&2&1\\ 3&2&1&3&2&3&1&4&1&4&1&1\\ 3&3&4&1&1&1&2&1&2&2&1&1\\ 1&2&4&2&3&4&2&2&1&3&1&3\\ 3&1&1&2&1&3&3&2&2&1&4&3\\ 1&4&1&1&1&4&1&3&4&1&1&4\\ 2&1&2&1&3&1&3&4&1&1&1&2\\ 2&4&1&3&1&1&4&1&1&3&2&3\\ 1&1&3&3&1&2&2&4&1&2&4&4\\ 4&1&1&4&3&2&1&1&3&2&1&3 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1&0&0&0&0&0&0&0&0&0&0&0\\ 0&1&0&0&0&0&0&0&0&0&0&0\\ 0&0&0&1&0&0&0&0&0&0&0&0\\ 0&0&1&0&0&0&0&0&0&0&0&0\\ 0&0&0&0&0&0&0&1&0&0&0&0\\ 0&0&0&0&1&0&0&0&0&0&0&0\\ 0&0&0&0&0&1&0&0&0&0&0&0\\ 0&0&0&0&0&0&1&0&0&0&0&0\\ 0&0&0&0&0&0&0&0&0&0&0&1\\ 0&0&0&0&0&0&0&0&1&0&0&0\\ 0&0&0&0&0&0&0&0&0&1&0&0\\ 0&0&0&0&0&0&0&0&0&0&1&0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\ -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 \\ 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & -1 \\ -1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 \\ -1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 \\ 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & -1 & 1 \\ -1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 \\ 1 & 3 & 1 & 4 & 4 & 3 & 2 & 1 & 1 & 1 & 3 & 2 \\ 1 & 1 & 4 & 3 & 2 & 4 & 3 & 1 & 1 & 3 & 2 & 1 \\ 3 & 2 & 1 & 3 & 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 \\ 3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 & 2 & 2 & 1 & 1 \\ 1 & 2 & 4 & 2 & 3 & 4 & 2 & 2 & 3 & 1 & 1 & 3 \\ 3 & 1 & 1 & 2 & 1 & 3 & 3 & 2 & 4 & 1 & 4 & 1 \\ 1 & 4 & 1 & 1 & 1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 \\ 2 & 2 & 1 & 1 & 3 & 1 & 4 & 3 & 1 & 1 & 2 & 1 \\ 1 & 3 & 1 & 3 & 1 & 2 & 4 & 2 & 3 & 2 & 2 & 4 \\ 2 & 1 & 4 & 3 & 1 & 1 & 1 & 4 & 3 & 1 & 3 & 2 \\ 4 & 1 & 1 & 4 & 3 & 2 & 1 & 1 & 3 & 4 & 1 & 1 \end{pmatrix}$$

$$P1 = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

$$P2 = \begin{pmatrix} 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix},$$

$$H = \begin{pmatrix} 1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 \\ 1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 \\ -1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\ 1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 & -1 \\ -1 & 1 & 1 & -1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\ -1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 & 1 \end{pmatrix},$$

$$GH = \begin{pmatrix} 1 & 2 & 2 & 2 & 1 & 1 & 1 & 1 & 3 & 4 & 2 & 4 \\ 1 & 1 & 3 & 4 & 4 & 1 & 2 & 3 & 1 & 1 & 1 & 4 \\ 3 & 1 & 2 & 3 & 4 & 2 & 3 & 1 & 1 & 3 & 2 & 1 \\ 1 & 4 & 1 & 3 & 4 & 3 & 1 & 2 & 3 & 2 & 1 & 1 \\ 3 & 3 & 4 & 1 & 1 & 1 & 2 & 1 & 2 & 2 & 1 & 1 \\ 3 & 1 & 1 & 2 & 3 & 1 & 1 & 4 & 4 & 1 & 4 & 1 \\ 1 & 4 & 1 & 1 & 3 & 2 & 3 & 1 & 2 & 1 & 3 & 4 \\ 1 & 2 & 4 & 2 & 3 & 4 & 2 & 2 & 1 & 3 & 3 & 1 \\ 1 & 1 & 1 & 1 & 1 & 4 & 4 & 4 & 1 & 2 & 2 & 2 \\ 2 & 1 & 4 & 3 & 1 & 1 & 3 & 2 & 3 & 1 & 3 & 2 \\ 4 & 2 & 1 & 3 & 1 & 3 & 2 & 1 & 1 & 1 & 4 & 3 \\ 2 & 3 & 1 & 4 & 1 & 2 & 1 & 3 & 1 & 4 & 3 & 1 \end{pmatrix}$$