Motivic invariants of character stacks

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Appendix A

TQFT for upper triangular matrices

The following pages describe the $\mathrm{K}_0(\mathbf{Var}_k)$-module morphism Z_G^{rep} () for the groups $G = \mathbb{U}_n$ and $G = \mathbb{T}_n$ over $k = \mathbb{C}$ for $2 \leq n \leq 5$. We restrict these maps to the $\mathrm{K}_0(\mathbf{Var}_k)$-submodule of $\mathrm{K}_0(\mathbf{Var}_G)$ generated by the elements $\mathbf{1}_{\mathcal{U}_1}, \ldots, \mathbf{1}_{\mathcal{U}_M} \in \mathrm{K}_0(\mathbf{Var}_G)$, corresponding to the inclusions of the unipotent conjugacy classes $\mathcal{U}_i \to G$, and express them as matrices with respect to these generators.

For every $2 \leq n \leq 5$, representatives for these unipotent conjugacy classes are, in order, given by:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Case $G = \mathbb{U}_2$. The matrix associated to $Z^{\text{rep}}_{\mathbb{U}_2}$ () is given by

$$\begin{bmatrix}\mathbb{L}^2 & 0\\ 0 & \mathbb{L}^2\end{bmatrix},$$

for which both $\mathbf{1}_{\mathcal{U}_1}$ and $\mathbf{1}_{\mathcal{U}_2}$ are eigenvectors with eigenvalue $\mathbb{L}^2$.

Case $G = \mathbb{T}_2$. The matrix associated to $Z^{\text{rep}}_{\mathbb{T}_2}$ () is given by

$$\begin{bmatrix}\mathbb{L}^2\left(\mathbb{L}-1\right) & \mathbb{L}^2\left(\mathbb{L}-2\right)\left(\mathbb{L}-1\right)\\ \mathbb{L}^2\left(\mathbb{L}-2\right) & \mathbb{L}^2\left(\mathbb{L}^2-3\mathbb{L}+3\right)\end{bmatrix},$$

whose eigenvalues are $\mathbb{L}^2$ and $\mathbb{L}^2(\mathbb{L}-1)^2$ with respective eigenvectors

$$\begin{bmatrix}1-\mathbb{L}\\ 1\end{bmatrix} \quad \text{and} \quad \begin{bmatrix}1\\ 1\end{bmatrix}.$$

Case $G = \mathbb{U}_3$. The matrix associated to $Z^{\mathrm{rep}}_{\mathbb{U}_3}$ () is given by

$$\begin{bmatrix} \mathbb{L}^3\left(\mathbb{L}^2+\mathbb{L}-1\right) & 0 & \mathbb{L}^3(\mathbb{L}-1)^2(\mathbb{L}+1) & 0 & 0 \\ 0 & \mathbb{L}^6 & 0 & 0 & 0 \\ \mathbb{L}^3(\mathbb{L}-1)(\mathbb{L}+1) & 0 & \mathbb{L}^3\left(\mathbb{L}^3-\mathbb{L}^2+1\right) & 0 & 0 \\ 0 & 0 & 0 & \mathbb{L}^6 & 0 \\ 0 & 0 & 0 & 0 & \mathbb{L}^6 \end{bmatrix},$$

whose eigenvalues are $\mathbb{L}^4$ and $\mathbb{L}^6$ (with multiplicity 4), with respective eigenvectors

$$\begin{bmatrix} 1-\mathbb{L} \\ 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 1 \end{bmatrix}.$$

Case $G = \mathbb{T}_3$. The matrix associated to $Z^{\mathrm{rep}}_{\mathbb{T}_3}$ () is given by

$$\left[\begin{matrix} \mathbb{L}^3(\mathbb{L}-1)^2\left(\mathbb{L}^2+\mathbb{L}-1\right) & \mathbb{L}^6(\mathbb{L}-2)(\mathbb{L}-1)^2 & \mathbb{L}^3(\mathbb{L}-1)^4(\mathbb{L}+1) \\ \mathbb{L}^5(\mathbb{L}-2)(\mathbb{L}-1) & \mathbb{L}^6(\mathbb{L}-1)\left(\mathbb{L}^2-3\mathbb{L}+3\right) & \mathbb{L}^5(\mathbb{L}-2)(\mathbb{L}-1)^2 \\ \mathbb{L}^3(\mathbb{L}-1)^3(\mathbb{L}+1) & \mathbb{L}^6(\mathbb{L}-2)(\mathbb{L}-1)^2 & \mathbb{L}^3(\mathbb{L}-1)^2\left(\mathbb{L}^3-\mathbb{L}^2+1\right) \\ \mathbb{L}^5(\mathbb{L}-2)(\mathbb{L}-1) & \mathbb{L}^6(\mathbb{L}-2)^2(\mathbb{L}-1) & \mathbb{L}^5(\mathbb{L}-2)(\mathbb{L}-1)^2 \\ \mathbb{L}^5(\mathbb{L}-2)^2 & \mathbb{L}^6(\mathbb{L}-2)\left(\mathbb{L}^2-3\mathbb{L}+3\right) & \mathbb{L}^5(\mathbb{L}-2)^2(\mathbb{L}-1) \end{matrix}\right.$$

$$\left.\begin{matrix} \mathbb{L}^6(\mathbb{L}-2)(\mathbb{L}-1)^2 & \mathbb{L}^6(\mathbb{L}-2)^2(\mathbb{L}-1)^2 \\ \mathbb{L}^6(\mathbb{L}-2)^2(\mathbb{L}-1) & \mathbb{L}^6(\mathbb{L}-2)(\mathbb{L}-1)\left(\mathbb{L}^2-3\mathbb{L}+3\right) \\ \mathbb{L}^6(\mathbb{L}-2)(\mathbb{L}-1)^2 & \mathbb{L}^6(\mathbb{L}-2)^2(\mathbb{L}-1)^2 \\ \mathbb{L}^6(\mathbb{L}-1)\left(\mathbb{L}^2-3\mathbb{L}+3\right) & \mathbb{L}^6(\mathbb{L}-2)(\mathbb{L}-1)\left(\mathbb{L}^2-3\mathbb{L}+3\right) \\ \mathbb{L}^6(\mathbb{L}-2)\left(\mathbb{L}^2-3\mathbb{L}+3\right) & \mathbb{L}^6\left(\mathbb{L}^2-3\mathbb{L}+3\right)^2 \end{matrix}\right],$$

whose eigenvalues are

$$\mathbb{L}^6, \quad \mathbb{L}^4(\mathbb{L}-1)^2, \quad \mathbb{L}^6(\mathbb{L}-1)^2, \quad \mathbb{L}^6(\mathbb{L}-1)^2, \quad \mathbb{L}^6(\mathbb{L}-1)^4$$

with respective eigenvectors

$$\begin{bmatrix} \mathbb{L}^2-2\mathbb{L}+1 \\ 1-\mathbb{L} \\ \mathbb{L}^2-2\mathbb{L}+1 \\ 1-\mathbb{L} \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 1-\mathbb{L} \\ 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \quad \begin{bmatrix} 0 \\ -1 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \quad \begin{bmatrix} 1-\mathbb{L} \\ 2-\mathbb{L} \\ 1-\mathbb{L} \\ 0 \\ 1 \end{bmatrix}, \quad \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}.$$

Case $G = \mathbb{U}_4$. The matrix associated to $Z^{\text{rep}}_{\mathbb{U}_4}$ () (which we do not print due to its size) has eigenvalues, with multiplicity, given by

$$\mathbb{L}^8 \text{ (mult. 2)}, \quad \mathbb{L}^{10} \text{ (mult. 6)}, \quad \mathbb{L}^{12} \text{ (mult. 8)}$$

with respective eigenvectors

- $\mathbf{1}_{\mathcal{U}_4} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_1}$
- $\mathbf{1}_{\mathcal{U}_{14}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_5}$
- $\mathbf{1}_{\mathcal{U}_3} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4})$
- $\mathbf{1}_{\mathcal{U}_3} - \mathbf{1}_{\mathcal{U}_6}$
- $\mathbf{1}_{\mathcal{U}_9} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_2}$
- $\mathbf{1}_{\mathcal{U}_{11}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_3}$
- $\mathbf{1}_{\mathcal{U}_{12}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_7}$
- $\mathbf{1}_{\mathcal{U}_{16}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{10}}$
- $\mathbf{1}_{\mathcal{U}_8}$
- $\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_9}$
- $\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{11}}$
- $\mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{12}}$
- $\mathbf{1}_{\mathcal{U}_{13}}$
- $\mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}}$
- $\mathbf{1}_{\mathcal{U}_{15}}$
- $\mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{16}}$.

Case $G = \mathbb{T}_4$. The matrix associated to $Z^{\text{rep}}_{\mathbb{T}_4}$ () has eigenvalues, with multiplicity, given by

$$\mathbb{L}^{10}, \quad \mathbb{L}^{12}, \quad \mathbb{L}^8(\mathbb{L}-1)^2, \quad \mathbb{L}^{10}(\mathbb{L}-1)^2 \text{ (mult. 3)}, \quad \mathbb{L}^{12}(\mathbb{L}-1)^2 \text{ (mult. 3)},$$

$$\mathbb{L}^8(\mathbb{L}-1)^4, \quad \mathbb{L}^{10}(\mathbb{L}-1)^4 \text{ (mult. 2)}, \quad \mathbb{L}^{12}(\mathbb{L}-1)^4 \text{ (mult. 3)}, \quad \mathbb{L}^{12}(\mathbb{L}-1)^6$$

with respective eigenvectors

- $\mathbf{1}_{\mathcal{U}_{16}} + (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4}) - (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_6}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{10}} - \mathbf{1}_{\mathcal{U}_{11}})$
- $\mathbf{1}_{\mathcal{U}_{15}} - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{11}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{14}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{16}})$
- $\mathbf{1}_{\mathcal{U}_{14}} + \mathbb{L}(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_1} - \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_4} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_5}$
- $\mathbf{1}_{\mathcal{U}_9} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{11}})$
- $\mathbf{1}_{\mathcal{U}_9} - \mathbf{1}_{\mathcal{U}_{12}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_2} - \mathbf{1}_{\mathcal{U}_7}) + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_3} - \mathbf{1}_{\mathcal{U}_6})$
- $\mathbf{1}_{\mathcal{U}_9} + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_{16}}) - \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_6} + (\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_{10}}$
- $\mathbf{1}_{\mathcal{U}_8} - \mathbf{1}_{\mathcal{U}_{13}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_2} - \mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_9} - \mathbf{1}_{\mathcal{U}_{12}})$
- $\mathbf{1}_{\mathcal{U}_{15}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_6} - \mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{11}} - \mathbf{1}_{\mathcal{U}_{12}}) + (\mathbb{L}-2)(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{14}}) - (2\mathbb{L}-3)\mathbf{1}_{\mathcal{U}_8}$
- $\mathbf{1}_{\mathcal{U}_8} - \mathbf{1}_{\mathcal{U}_{10}} - \mathbf{1}_{\mathcal{U}_{16}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_5} - \mathbf{1}_{\mathcal{U}_7} - \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{14}})$
- $\mathbf{1}_{\mathcal{U}_{14}} - \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_1} + \mathbb{L}\mathbf{1}_{\mathcal{U}_4} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_5}$

- $\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{11}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4})$
- $\mathbf{1}_{\mathcal{U}_9} - \mathbf{1}_{\mathcal{U}_{12}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_2} - \mathbf{1}_{\mathcal{U}_7}) - \mathbb{L}(\mathbf{1}_{\mathcal{U}_3} - \mathbf{1}_{\mathcal{U}_6})$
- $\mathbf{1}_{\mathcal{U}_2} - \mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_9} - \mathbf{1}_{\mathcal{U}_{12}} - \mathbf{1}_{\mathcal{U}_{13}}$
- $\mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{12}} - \mathbf{1}_{\mathcal{U}_{15}} + (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{11}}) + (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{14}}) + (\mathbb{L}-3)\mathbf{1}_{\mathcal{U}_8}$
- $\mathbf{1}_{\mathcal{U}_5} - \mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_8} - \mathbf{1}_{\mathcal{U}_{10}} - \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{14}} - \mathbf{1}_{\mathcal{U}_{16}}$
- $\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{16}}$.

Case $G = \mathbb{U}_5$**.** The matrix associated to $Z^{\mathrm{rep}}_{\mathbb{U}_5}$ () has eigenvalues, with multiplicity, given by

$$\mathbb{L}^{12}, \quad \mathbb{L}^{14} \text{ (mult. 6)}, \quad \mathbb{L}^{16} \text{ (mult. 18)}, \quad \mathbb{L}^{18} \text{ (mult. 20)}, \quad \mathbb{L}^{20} \text{ (mult. 16)}$$

with respective eigenvectors

- $\mathbf{1}_{\mathcal{U}_{36}} + \mathbb{L}\,(\mathbb{L}-1)^2\,\mathbf{1}_{\mathcal{U}_1} - \mathbb{L}\,(\mathbb{L}-1)\,\mathbf{1}_{\mathcal{U}_5} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_7}$
- $\mathbf{1}_{\mathcal{U}_{23}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_9}$
- $\mathbf{1}_{\mathcal{U}_{28}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_6}$
- $\mathbf{1}_{\mathcal{U}_{32}} + (\mathbb{L}-1)^2\,(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_5}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_8})$
- $\mathbf{1}_{\mathcal{U}_{36}} - \mathbb{L}\,(\mathbb{L}-1)\,\mathbf{1}_{\mathcal{U}_1} + \mathbb{L}\mathbf{1}_{\mathcal{U}_5} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_7}$
- $\mathbf{1}_{\mathcal{U}_{46}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{15}}$
- $\mathbf{1}_{\mathcal{U}_{53}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{19}}$
- $\mathbf{1}_{\mathcal{U}_4} - \mathbf{1}_{\mathcal{U}_8}$
- $\mathbf{1}_{\mathcal{U}_{17}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{11}}$
- $\mathbf{1}_{\mathcal{U}_{22}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{10}}$
- $\mathbf{1}_{\mathcal{U}_{18}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{23}})$
- $\mathbf{1}_{\mathcal{U}_{26}} + \mathbb{L}\,(\mathbb{L}-1)^2\,(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5}) - \mathbb{L}\,(\mathbb{L}-1)\,(\mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_{10}})$
- $\mathbf{1}_{\mathcal{U}_{27}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{28}})$
- $\mathbf{1}_{\mathcal{U}_{32}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_5}) - (\mathbb{L}-2)\mathbf{1}_{\mathcal{U}_4}$
- $\mathbf{1}_{\mathcal{U}_{34}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_3}$
- $\mathbf{1}_{\mathcal{U}_{35}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_2}$
- $\mathbf{1}_{\mathcal{U}_{42}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{13}}$
- $\mathbf{1}_{\mathcal{U}_{47}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{16}}$
- $\mathbf{1}_{\mathcal{U}_{48}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{20}}$
- $\mathbf{1}_{\mathcal{U}_{50}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{21}}$
- $\mathbf{1}_{\mathcal{U}_{52}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{29}}$
- $\mathbf{1}_{\mathcal{U}_{55}} + (\mathbb{L}-1)^2\,(\mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{36}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{24}} + \mathbf{1}_{\mathcal{U}_{31}})$
- $\mathbf{1}_{\mathcal{U}_{56}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{25}}$
- $\mathbf{1}_{\mathcal{U}_{60}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{41}}$
- $\mathbf{1}_{\mathcal{U}_{61}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{51}}$
- $\mathbf{1}_{\mathcal{U}_{14}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{17}})$
- $\mathbf{1}_{\mathcal{U}_{24}} - \mathbf{1}_{\mathcal{U}_{31}}$

- $\mathbf{1}_{\mathcal{U}_{26}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_{32}}) - (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{22}})$
- $\mathbf{1}_{\mathcal{U}_3} - \mathbf{1}_{\mathcal{U}_{10}} - \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{34}}$
- $\mathbf{1}_{\mathcal{U}_{33}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_{35}})$
- $\mathbf{1}_{\mathcal{U}_7} - \mathbf{1}_{\mathcal{U}_{10}} - \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{24}} - \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{36}}$
- $\mathbf{1}_{\mathcal{U}_{38}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{33}}$
- $\mathbf{1}_{\mathcal{U}_{40}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{12}}$
- $\mathbf{1}_{\mathcal{U}_{45}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{14}}$
- $\mathbf{1}_{\mathcal{U}_{44}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{46}})$
- $\mathbf{1}_{\mathcal{U}_{14}} - \mathbf{1}_{\mathcal{U}_{16}} - \mathbf{1}_{\mathcal{U}_{47}}$
- $\mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{50}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{23}})$
- $\mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{52}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{28}})$
- $\mathbf{1}_{\mathcal{U}_{54}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{30}}$
- $\mathbf{1}_{\mathcal{U}_{24}} + \mathbf{1}_{\mathcal{U}_{55}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}})$
- $\mathbf{1}_{\mathcal{U}_{25}} - \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{56}}$
- $\mathbf{1}_{\mathcal{U}_{58}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{39}}$
- $\mathbf{1}_{\mathcal{U}_{59}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{43}}$
- $\mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{60}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{42}})$
- $\mathbf{1}_{\mathcal{U}_{51}} + \mathbf{1}_{\mathcal{U}_{61}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{48}})$
- $\mathbf{1}_{\mathcal{U}_{37}}$
- $\mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{40}}$
- $\mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{44}} + \mathbf{1}_{\mathcal{U}_{46}}$
- $\mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{45}} + \mathbf{1}_{\mathcal{U}_{47}}$
- $\mathbf{1}_{\mathcal{U}_{49}}$
- $\mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{50}}$
- $\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{52}}$
- $\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{53}}$
- $\mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{54}}$
- $\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{24}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{55}}$
- $\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{56}}$
- $\mathbf{1}_{\mathcal{U}_{57}}$
- $\mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{58}}$
- $\mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{59}}$
- $\mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{42}} + \mathbf{1}_{\mathcal{U}_{60}}$
- $\mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{48}} + \mathbf{1}_{\mathcal{U}_{51}} + \mathbf{1}_{\mathcal{U}_{61}}$.

Case $G = \mathbb{T}_5$. The matrix associated to $Z^{\mathrm{rep}}_{\mathbb{T}_5}$ () has eigenvalues, with multiplicity, given by

$$\mathbb{L}^{12}(\mathbb{L}-1)^4,\ \mathbb{L}^{14}(\mathbb{L}-1)^2\ \text{(mult. 2)},\ \mathbb{L}^{16}\ \text{(mult. 2)},\ \mathbb{L}^{14}(\mathbb{L}-1)^4\ \text{(mult. 3)},$$

$$\mathbb{L}^{16}(\mathbb{L}-1)^2\ \text{(mult. 7)},\ \mathbb{L}^{18}\ \text{(mult. 2)},\ \mathbb{L}^{14}(\mathbb{L}-1)^6,\ \mathbb{L}^{16}(\mathbb{L}-1)^4\ \text{(mult. 7)},$$

$$\mathbb{L}^{18}(\mathbb{L}-1)^2\ \text{(mult. 7)},\ \mathbb{L}^{20},\ \mathbb{L}^{16}(\mathbb{L}-1)^6\ \text{(mult. 2)},\ \mathbb{L}^{18}(\mathbb{L}-1)^4\ \text{(mult. 8)},$$

$$\mathbb{L}^{20}(\mathbb{L}-1)^2 \text{ (mult. 4)},\ \mathbb{L}^{18}(\mathbb{L}-1)^6 \text{ (mult. 3)},\ \mathbb{L}^{20}(\mathbb{L}-1)^4 \text{ (mult. 6)},$$
$$\mathbb{L}^{20}(\mathbb{L}-1)^6 \text{ (mult. 4)},\ \mathbb{L}^{20}(\mathbb{L}-1)^8$$

with respective eigenvectors

- $\mathbf{1}_{\mathcal{U}_{13}} + \mathbb{L}(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_1} - \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_5} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{10}}$
- $\mathbf{1}_{\mathcal{U}_{25}} - \mathbb{L}^2(\mathbb{L}-1)^3\mathbf{1}_{\mathcal{U}_1} + \mathbb{L}^2(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_5} + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{18}}) - \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{22}}) - \mathbb{L}(\mathbb{L}-1)^3\mathbf{1}_{\mathcal{U}_{10}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{23}}$
- $\mathbf{1}_{\mathcal{U}_{45}} + \mathbb{L}(\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_5}) - \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_{14}}) + \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{17}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{42}}$
- $\mathbf{1}_{\mathcal{U}_{29}} + \mathbb{L}(\mathbb{L}-1)^4(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5}) - \mathbb{L}(\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{17}}) + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{16}} - \mathbf{1}_{\mathcal{U}_{31}}) - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{22}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{26}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{28}}) + \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{33}}$
- $\mathbf{1}_{\mathcal{U}_{55}} + \mathbb{L}(\mathbb{L}-1)^4(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}}) - \mathbb{L}(\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{30}}) - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_9}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{47}}) + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{34}} - \mathbf{1}_{\mathcal{U}_{43}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{49}} + \mathbf{1}_{\mathcal{U}_{53}}) + \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{46}}$
- $\mathbf{1}_{\mathcal{U}_9} - \mathbf{1}_{\mathcal{U}_{22}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_6} - \mathbf{1}_{\mathcal{U}_{18}})$
- $\mathbf{1}_{\mathcal{U}_{25}} + \mathbb{L}^2(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_1} - \mathbb{L}^2(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_5} + \mathbb{L}(\mathbb{L}-2)(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_6} - \mathbb{L}(\mathbb{L}-2)\mathbf{1}_{\mathcal{U}_9} + \mathbb{L}(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_{10}} - \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{13}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{23}}$
- $\mathbf{1}_{\mathcal{U}_{45}} - \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_5}) + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_{14}}) - \mathbb{L}\mathbf{1}_{\mathcal{U}_{17}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{42}}$
- $\mathbf{1}_{\mathcal{U}_{28}} - \mathbb{L}(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_2} + \mathbb{L}^2(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_3} + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{19}}) - \mathbb{L}^2(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{16}} - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{22}}) - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{20}} + (\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_{26}} - \mathbb{L}\mathbf{1}_{\mathcal{U}_{27}}$
- $\mathbf{1}_{\mathcal{U}_{29}} - \mathbb{L}(\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{16}}) - \mathbb{L}(\mathbb{L}-2)(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{22}}) + \mathbb{L}(\mathbb{L}-1)^4\mathbf{1}_{\mathcal{U}_3} + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{17}}) + \mathbb{L}(\mathbb{L}-2)(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{26}}) + (\mathbb{L}-1)\left(\mathbb{L}^2-\mathbb{L}-1\right)\mathbf{1}_{\mathcal{U}_{19}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{21}} - (\mathbb{L}^2-\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{27}}$
- $\mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{33}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{22}}) - \mathbb{L}(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_3} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{31}}) + \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{16}}$
- $\mathbf{1}_{\mathcal{U}_{40}} - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{17}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{34}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{38}})$
- $\mathbf{1}_{\mathcal{U}_{37}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_9}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_{35}}) - \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{43}} + \mathbb{L}\mathbf{1}_{\mathcal{U}_{46}}$
- $\mathbf{1}_{\mathcal{U}_{37}} - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_9}) + (\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_8} + \mathbb{L}^2(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_{30}} - \mathbb{L}^2(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{34}} - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{35}} - \mathbb{L}(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_{41}} + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{44}} + \mathbf{1}_{\mathcal{U}_{47}}) - \mathbb{L}\mathbf{1}_{\mathcal{U}_{49}}$
- $\mathbb{L}^2(\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}}) - \mathbb{L}^2(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_{17}}) - (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_9}) + (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_8} + \mathbb{L}^2(\mathbb{L}-2)(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_{30}} - \mathbb{L}^2(\mathbb{L}-2)(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{34}} - (\mathbb{L}-1)\left(\mathbb{L}^2-\mathbb{L}-1\right)\mathbf{1}_{\mathcal{U}_{35}} + (\mathbb{L}^2-\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{37}} - \mathbb{L}(\mathbb{L}-1)^3\mathbf{1}_{\mathcal{U}_{41}} + \mathbb{L}(\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_{44}} + \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{53}} - \mathbb{L}\mathbf{1}_{\mathcal{U}_{55}}$
- $\mathbf{1}_{\mathcal{U}_{54}} - (\mathbb{L}-1)^4(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}}) + (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}}) - (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{40}} - \mathbf{1}_{\mathcal{U}_{47}} - \mathbf{1}_{\mathcal{U}_{49}}) + (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{39}} - \mathbf{1}_{\mathcal{U}_{48}} - \mathbf{1}_{\mathcal{U}_{53}} - \mathbf{1}_{\mathcal{U}_{55}})$
- $\mathbf{1}_{\mathcal{U}_{59}} - (\mathbb{L}-1)^4(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{34}}) + (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{44}}) - (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{12}} - \mathbf{1}_{\mathcal{U}_{19}} - \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{40}} + \mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{46}} + \mathbf{1}_{\mathcal{U}_{50}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{29}} - \mathbf{1}_{\mathcal{U}_{52}} + \mathbf{1}_{\mathcal{U}_{57}})$

- $\mathbf{1}_{\mathcal{U}_{25}} - \mathbb{L}^2(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_1} + \mathbb{L}^2\mathbf{1}_{\mathcal{U}_5} - \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{18}}) + \mathbb{L}(\mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{22}}) - (\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{23}}$
- $\mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{28}} + \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_2} - \mathbb{L}\mathbf{1}_{\mathcal{U}_{15}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{22}})$
- $\mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5}) + \mathbb{L}(\mathbb{L}-2)(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_2} - \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}}) - \mathbb{L}(\mathbb{L}-2)\mathbf{1}_{\mathcal{U}_{15}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}})$
- $\mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{33}} + (\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_2} + \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_3} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{31}}) - \mathbb{L}\mathbf{1}_{\mathcal{U}_{16}}$
- $\mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{40}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{17}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{38}})$
- $\mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_{37}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{35}}) + \mathbb{L}(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{41}} - \mathbb{L}\mathbf{1}_{\mathcal{U}_{44}}$
- $\mathbf{1}_{\mathcal{U}_8} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{37}}) + \mathbb{L}^2(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{30}} - \mathbb{L}^2\mathbf{1}_{\mathcal{U}_{34}} + (\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_{35}} - \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{47}}) + \mathbb{L}(\mathbf{1}_{\mathcal{U}_{46}} + \mathbf{1}_{\mathcal{U}_{49}})$
- $\mathbb{L}^2(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}}) - \mathbb{L}^2(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_{17}}) + (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_9}) - (\mathbb{L}-1)^2\mathbf{1}_{\mathcal{U}_8} + \mathbb{L}^2(\mathbb{L}-2)(\mathbb{L}-1)\mathbf{1}_{\mathcal{U}_{30}} - \mathbb{L}^2(\mathbb{L}-2)\mathbf{1}_{\mathcal{U}_{34}} + (\mathbb{L}-1)\left(\mathbb{L}^2-3\mathbb{L}+1\right)\mathbf{1}_{\mathcal{U}_{35}} - (\mathbb{L}^2-3\mathbb{L}+1)\mathbf{1}_{\mathcal{U}_{37}} + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{53}}) - \mathbb{L}(\mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{55}})$
- $\mathbf{1}_{\mathcal{U}_{36}} - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{40}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{39}})$
- $\mathbf{1}_{\mathcal{U}_{36}} - \mathbf{1}_{\mathcal{U}_{51}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{27}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}}) - \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} - \mathbf{1}_{\mathcal{U}_{30}} - \mathbf{1}_{\mathcal{U}_{32}} - \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{44}}) + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{11}} - \mathbf{1}_{\mathcal{U}_{31}} - \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{50}})$
- $\mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{52}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{46}} + \mathbf{1}_{\mathcal{U}_{50}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{44}})$
- $\mathbf{1}_{\mathcal{U}_{36}} - \mathbb{L}(\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}}) - (\mathbb{L}-1)^2\left(\mathbb{L}^2-3\mathbb{L}+1\right)(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_{15}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_9} - \mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{48}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{54}}) + (\mathbb{L}-1)^3\mathbf{1}_{\mathcal{U}_{11}} + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}}) + (\mathbb{L}-1)\left(\mathbb{L}^2-3\mathbb{L}+1\right)(\mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}})$
- $\mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{53}} + \mathbf{1}_{\mathcal{U}_{55}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_{15}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{47}} + \mathbf{1}_{\mathcal{U}_{49}})$
- $\mathbf{1}_{\mathcal{U}_{36}} - \mathbf{1}_{\mathcal{U}_{58}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} - \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{19}} - \mathbf{1}_{\mathcal{U}_{22}} - \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{27}}) - \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{16}} - \mathbf{1}_{\mathcal{U}_{30}} - \mathbf{1}_{\mathcal{U}_{34}} - \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{44}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_7} - \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{21}} - \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{39}} - \mathbf{1}_{\mathcal{U}_{56}}) + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{46}})$
- $\mathbf{1}_{\mathcal{U}_{36}} - \mathbb{L}(\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{17}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{57}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{59}}) - \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{12}} - \mathbf{1}_{\mathcal{U}_{32}} - \mathbf{1}_{\mathcal{U}_{38}}) - (\mathbb{L}-2)(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{27}}) + (\mathbb{L}-2)(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{29}}) - \mathbb{L}(\mathbb{L}-2)(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{34}})$
- $\mathbf{1}_{\mathcal{U}_{61}} + (\mathbb{L}-1)^4(\mathbf{1}_{\mathcal{U}_1} + \mathbf{1}_{\mathcal{U}_3} + \mathbf{1}_{\mathcal{U}_4} + \mathbf{1}_{\mathcal{U}_5} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{40}}) - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_2} + \mathbf{1}_{\mathcal{U}_6} + \mathbf{1}_{\mathcal{U}_8} + \mathbf{1}_{\mathcal{U}_9} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{44}} + \mathbf{1}_{\mathcal{U}_{46}} + \mathbf{1}_{\mathcal{U}_{50}} + \mathbf{1}_{\mathcal{U}_{52}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_7} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{42}} + \mathbf{1}_{\mathcal{U}_{45}} + \mathbf{1}_{\mathcal{U}_{47}} + \mathbf{1}_{\mathcal{U}_{49}} + \mathbf{1}_{\mathcal{U}_{51}} + \mathbf{1}_{\mathcal{U}_{53}} + \mathbf{1}_{\mathcal{U}_{55}} + \mathbf{1}_{\mathcal{U}_{56}} + \mathbf{1}_{\mathcal{U}_{58}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{24}} + \mathbf{1}_{\mathcal{U}_{48}} + \mathbf{1}_{\mathcal{U}_{54}} + \mathbf{1}_{\mathcal{U}_{57}} + \mathbf{1}_{\mathcal{U}_{59}} + \mathbf{1}_{\mathcal{U}_{60}})$

- $\mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{29}} - \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}}) + \mathbb{L}(\mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{22}})$
- $\mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{49}} + \mathbf{1}_{\mathcal{U}_{55}} - \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{41}}) + \mathbb{L}(\mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{44}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{47}} + \mathbf{1}_{\mathcal{U}_{53}})$
- $\mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} - \mathbf{1}_{\mathcal{U}_{35}} - \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{39}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{2}} - \mathbf{1}_{\mathcal{U}_{6}} - \mathbf{1}_{\mathcal{U}_{8}} - \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}})$
- $\mathbf{1}_{\mathcal{U}_{36}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}}) + (\mathbb{L}-2)(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{40}}) - (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}})$
- $\mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{28}} - \mathbf{1}_{\mathcal{U}_{35}} - \mathbf{1}_{\mathcal{U}_{37}} + (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} - \mathbf{1}_{\mathcal{U}_{18}} - \mathbf{1}_{\mathcal{U}_{22}} - \mathbf{1}_{\mathcal{U}_{26}}) - \mathbb{L}(\mathbf{1}_{\mathcal{U}_{11}} - \mathbf{1}_{\mathcal{U}_{31}} - \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}})$
- $\mathbf{1}_{\mathcal{U}_{36}} - \mathbf{1}_{\mathcal{U}_{51}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{7}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}}) + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} - \mathbf{1}_{\mathcal{U}_{30}} - \mathbf{1}_{\mathcal{U}_{32}} - \mathbf{1}_{\mathcal{U}_{34}}) + \mathbb{L}(\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{11}} - \mathbf{1}_{\mathcal{U}_{31}} - \mathbf{1}_{\mathcal{U}_{33}})$
- $\mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{28}} - (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}}) + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{11}} - \mathbf{1}_{\mathcal{U}_{31}} - \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{44}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}} - \mathbf{1}_{\mathcal{U}_{35}} - \mathbf{1}_{\mathcal{U}_{37}}) + \mathbb{L}(\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{46}}) - \mathbb{L}\mathbf{1}_{\mathcal{U}_{52}}$
- $\mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{53}} + \mathbf{1}_{\mathcal{U}_{54}} + \mathbf{1}_{\mathcal{U}_{55}}) - \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{34}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{47}} + \mathbf{1}_{\mathcal{U}_{48}} + \mathbf{1}_{\mathcal{U}_{49}})$
- $\mathbf{1}_{\mathcal{U}_{36}} - \mathbf{1}_{\mathcal{U}_{58}} + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{16}} - \mathbf{1}_{\mathcal{U}_{30}} - \mathbf{1}_{\mathcal{U}_{34}} - \mathbf{1}_{\mathcal{U}_{38}}) + (\mathbb{L}-2)(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} - \mathbf{1}_{\mathcal{U}_{18}} - \mathbf{1}_{\mathcal{U}_{22}} - \mathbf{1}_{\mathcal{U}_{26}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{7}} - \mathbf{1}_{\mathcal{U}_{56}}) + (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{28}} - \mathbf{1}_{\mathcal{U}_{35}} - \mathbf{1}_{\mathcal{U}_{37}})$
- $\mathbf{1}_{\mathcal{U}_{36}} + \mathbb{L}(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{44}}) + (\mathbb{L}-2)(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{7}} - \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{21}} - \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{59}}) + \mathbb{L}(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{12}} - \mathbf{1}_{\mathcal{U}_{32}} - \mathbf{1}_{\mathcal{U}_{38}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{46}}) - (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{18}} - \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}} - \mathbf{1}_{\mathcal{U}_{27}} - \mathbf{1}_{\mathcal{U}_{57}}) + \mathbb{L}(\mathbb{L}-2)(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{34}}) - (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}})$
- $\mathbf{1}_{\mathcal{U}_{24}} - \mathbf{1}_{\mathcal{U}_{48}} - \mathbf{1}_{\mathcal{U}_{54}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{28}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{52}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{47}} - \mathbf{1}_{\mathcal{U}_{49}} - \mathbf{1}_{\mathcal{U}_{51}} - \mathbf{1}_{\mathcal{U}_{53}} - \mathbf{1}_{\mathcal{U}_{55}})$
- $\mathbf{1}_{\mathcal{U}_{24}} - \mathbf{1}_{\mathcal{U}_{57}} - \mathbf{1}_{\mathcal{U}_{59}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{52}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{36}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{51}} - \mathbf{1}_{\mathcal{U}_{56}} - \mathbf{1}_{\mathcal{U}_{58}})$
- $\mathbf{1}_{\mathcal{U}_{48}} + \mathbf{1}_{\mathcal{U}_{54}} - \mathbf{1}_{\mathcal{U}_{60}} + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} - \mathbf{1}_{\mathcal{U}_{18}} - \mathbf{1}_{\mathcal{U}_{20}} - \mathbf{1}_{\mathcal{U}_{22}} - \mathbf{1}_{\mathcal{U}_{26}} - \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{39}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{7}} - \mathbf{1}_{\mathcal{U}_{23}} - \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{42}} + \mathbf{1}_{\mathcal{U}_{45}} + \mathbf{1}_{\mathcal{U}_{51}} - \mathbf{1}_{\mathcal{U}_{56}} - \mathbf{1}_{\mathcal{U}_{58}})$
- $\mathbf{1}_{\mathcal{U}_{61}} - (\mathbb{L}-1)^3(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{40}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{52}}) - (\mathbb{L}-2)(\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{39}}) + (\mathbb{L}-1)(2\mathbb{L}-3)(\mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{36}}) + (\mathbb{L}-1)^2(\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{28}} - \mathbf{1}_{\mathcal{U}_{56}} - \mathbf{1}_{\mathcal{U}_{58}}) + (\mathbb{L}-2)(\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}}) - (2\mathbb{L}-3)\mathbf{1}_{\mathcal{U}_{24}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{48}} + \mathbf{1}_{\mathcal{U}_{54}})$
- $\mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{40}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}})$

- $\mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{37}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{51}} - \mathbf{1}_{\mathcal{U}_{52}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{46}}) - \mathbb{L}(\mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} - \mathbf{1}_{\mathcal{U}_{30}} - \mathbf{1}_{\mathcal{U}_{31}} - \mathbf{1}_{\mathcal{U}_{32}} - \mathbf{1}_{\mathcal{U}_{33}} - \mathbf{1}_{\mathcal{U}_{34}})$
- $\mathbf{1}_{\mathcal{U}_{11}} - \mathbf{1}_{\mathcal{U}_{20}} - \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{51}} - \mathbf{1}_{\mathcal{U}_{58}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{15}} - \mathbf{1}_{\mathcal{U}_{18}} - \mathbf{1}_{\mathcal{U}_{22}} - \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{42}} + \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{56}}) - \mathbb{L}(\mathbf{1}_{\mathcal{U}_{3}} - \mathbf{1}_{\mathcal{U}_{10}} - \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{32}} - \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}})$
- $\mathbf{1}_{\mathcal{U}_{24}} - \mathbf{1}_{\mathcal{U}_{48}} - \mathbf{1}_{\mathcal{U}_{54}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{28}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{52}}) - (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{51}})$
- $\mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}} - \mathbf{1}_{\mathcal{U}_{23}} - \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}} + \mathbf{1}_{\mathcal{U}_{47}} + \mathbf{1}_{\mathcal{U}_{49}} - \mathbf{1}_{\mathcal{U}_{51}} + \mathbf{1}_{\mathcal{U}_{53}} + \mathbf{1}_{\mathcal{U}_{55}}$
- $\mathbf{1}_{\mathcal{U}_{7}} - \mathbf{1}_{\mathcal{U}_{23}} - \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{36}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{51}} + \mathbf{1}_{\mathcal{U}_{56}} + \mathbf{1}_{\mathcal{U}_{58}}$
- $\mathbf{1}_{\mathcal{U}_{24}} - \mathbf{1}_{\mathcal{U}_{57}} - \mathbf{1}_{\mathcal{U}_{59}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{52}}) - (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{36}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{51}})$
- $\mathbf{1}_{\mathcal{U}_{24}} - \mathbf{1}_{\mathcal{U}_{60}} - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{39}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{52}}) - (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}} - \mathbf{1}_{\mathcal{U}_{23}} - \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{36}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{51}})$
- $\mathbf{1}_{\mathcal{U}_{61}} + (\mathbb{L}-1)^2\,(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{40}}) + (\mathbb{L}-2)\,(\mathbb{L}-1)\,(\mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{39}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{52}}) + (\mathbb{L}-2)^2\,(\mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{36}}) - (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{25}}) - 2\,(\mathbb{L}-2)\,\mathbf{1}_{\mathcal{U}_{24}} - (\mathbb{L}^2 - 3\mathbb{L} + 3)(\mathbf{1}_{\mathcal{U}_{42}} + \mathbf{1}_{\mathcal{U}_{45}} + \mathbf{1}_{\mathcal{U}_{51}})$
- $\mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{24}} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{29}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{47}} - \mathbf{1}_{\mathcal{U}_{48}} - \mathbf{1}_{\mathcal{U}_{49}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{51}} - \mathbf{1}_{\mathcal{U}_{52}} - \mathbf{1}_{\mathcal{U}_{53}} - \mathbf{1}_{\mathcal{U}_{54}} - \mathbf{1}_{\mathcal{U}_{55}}$
- $\mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{24}} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{37}} - \mathbf{1}_{\mathcal{U}_{41}} - \mathbf{1}_{\mathcal{U}_{42}} - \mathbf{1}_{\mathcal{U}_{43}} - \mathbf{1}_{\mathcal{U}_{44}} - \mathbf{1}_{\mathcal{U}_{45}} - \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{50}} - \mathbf{1}_{\mathcal{U}_{51}} - \mathbf{1}_{\mathcal{U}_{52}} - \mathbf{1}_{\mathcal{U}_{56}} - \mathbf{1}_{\mathcal{U}_{57}} - \mathbf{1}_{\mathcal{U}_{58}} - \mathbf{1}_{\mathcal{U}_{59}}$
- $\mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} - \mathbf{1}_{\mathcal{U}_{18}} - \mathbf{1}_{\mathcal{U}_{20}} - \mathbf{1}_{\mathcal{U}_{22}} - \mathbf{1}_{\mathcal{U}_{23}} - \mathbf{1}_{\mathcal{U}_{25}} - \mathbf{1}_{\mathcal{U}_{26}} - \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{42}} + \mathbf{1}_{\mathcal{U}_{45}} + \mathbf{1}_{\mathcal{U}_{48}} + \mathbf{1}_{\mathcal{U}_{51}} + \mathbf{1}_{\mathcal{U}_{54}} - \mathbf{1}_{\mathcal{U}_{56}} - \mathbf{1}_{\mathcal{U}_{58}} - \mathbf{1}_{\mathcal{U}_{60}}$
- $\mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{44}} + \mathbf{1}_{\mathcal{U}_{46}} - \mathbf{1}_{\mathcal{U}_{48}} + \mathbf{1}_{\mathcal{U}_{50}} + \mathbf{1}_{\mathcal{U}_{52}} - \mathbf{1}_{\mathcal{U}_{54}} + \mathbf{1}_{\mathcal{U}_{56}} + \mathbf{1}_{\mathcal{U}_{58}} - \mathbf{1}_{\mathcal{U}_{61}} + (\mathbb{L}-1)(\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{40}}) + (\mathbb{L}-2)(\mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{39}}) + (\mathbb{L}-3)(\mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{24}} + \mathbf{1}_{\mathcal{U}_{36}})$
- $\mathbf{1}_{\mathcal{U}_{1}} + \mathbf{1}_{\mathcal{U}_{2}} + \mathbf{1}_{\mathcal{U}_{3}} + \mathbf{1}_{\mathcal{U}_{4}} + \mathbf{1}_{\mathcal{U}_{5}} + \mathbf{1}_{\mathcal{U}_{6}} + \mathbf{1}_{\mathcal{U}_{7}} + \mathbf{1}_{\mathcal{U}_{8}} + \mathbf{1}_{\mathcal{U}_{9}} + \mathbf{1}_{\mathcal{U}_{10}} + \mathbf{1}_{\mathcal{U}_{11}} + \mathbf{1}_{\mathcal{U}_{12}} + \mathbf{1}_{\mathcal{U}_{13}} + \mathbf{1}_{\mathcal{U}_{14}} + \mathbf{1}_{\mathcal{U}_{15}} + \mathbf{1}_{\mathcal{U}_{16}} + \mathbf{1}_{\mathcal{U}_{17}} + \mathbf{1}_{\mathcal{U}_{18}} + \mathbf{1}_{\mathcal{U}_{19}} + \mathbf{1}_{\mathcal{U}_{20}} + \mathbf{1}_{\mathcal{U}_{21}} + \mathbf{1}_{\mathcal{U}_{22}} + \mathbf{1}_{\mathcal{U}_{23}} + \mathbf{1}_{\mathcal{U}_{24}} + \mathbf{1}_{\mathcal{U}_{25}} + \mathbf{1}_{\mathcal{U}_{26}} + \mathbf{1}_{\mathcal{U}_{27}} + \mathbf{1}_{\mathcal{U}_{28}} + \mathbf{1}_{\mathcal{U}_{29}} + \mathbf{1}_{\mathcal{U}_{30}} + \mathbf{1}_{\mathcal{U}_{31}} + \mathbf{1}_{\mathcal{U}_{32}} + \mathbf{1}_{\mathcal{U}_{33}} + \mathbf{1}_{\mathcal{U}_{34}} + \mathbf{1}_{\mathcal{U}_{35}} + \mathbf{1}_{\mathcal{U}_{36}} + \mathbf{1}_{\mathcal{U}_{37}} + \mathbf{1}_{\mathcal{U}_{38}} + \mathbf{1}_{\mathcal{U}_{39}} + \mathbf{1}_{\mathcal{U}_{40}} + \mathbf{1}_{\mathcal{U}_{41}} + \mathbf{1}_{\mathcal{U}_{42}} + \mathbf{1}_{\mathcal{U}_{43}} + \mathbf{1}_{\mathcal{U}_{44}} + \mathbf{1}_{\mathcal{U}_{45}} + \mathbf{1}_{\mathcal{U}_{46}} + \mathbf{1}_{\mathcal{U}_{47}} + \mathbf{1}_{\mathcal{U}_{48}} + \mathbf{1}_{\mathcal{U}_{49}} + \mathbf{1}_{\mathcal{U}_{50}} + \mathbf{1}_{\mathcal{U}_{51}} + \mathbf{1}_{\mathcal{U}_{52}} + \mathbf{1}_{\mathcal{U}_{53}} + \mathbf{1}_{\mathcal{U}_{54}} + \mathbf{1}_{\mathcal{U}_{55}} + \mathbf{1}_{\mathcal{U}_{56}} + \mathbf{1}_{\mathcal{U}_{57}} + \mathbf{1}_{\mathcal{U}_{58}} + \mathbf{1}_{\mathcal{U}_{59}} + \mathbf{1}_{\mathcal{U}_{60}} + \mathbf{1}_{\mathcal{U}_{61}}.$