Problem 5. «Nonlinear hiding»

Nicole is learning about secret sharing. She created a binary vector $y \in \mathbb{F}_2^{6560}$ and splitted it into 20 shares $x_i \in \mathbb{F}_2^{6560}$ (here $\oplus$ denotes the bit-wise XOR):

$$y = x_1 \oplus x_2 \oplus \ldots \oplus x_{20}.$$

Then, she created 20 more random vectors $x_{21}, \ldots, x_{40}$ and shuffled them together with the shares $x_1, \ldots, x_{20}$. Formally, she chose a secret permutation σ of $\{1, \ldots, 40\}$ and computed

$$\begin{aligned} z_1 &= x_{\sigma(1)}, \\ z_2 &= x_{\sigma(2)}, \\ &\ldots \\ z_{40} &= x_{\sigma(40)}, \end{aligned}$$

where each vector $z_i \in \mathbb{F}_2^{6560}$. Finally, she splitted each z_i into 5-bit blocks, and applied a secret bijective mapping $\rho : \mathbb{F}_2^5 \to \mathcal{S}$, where

$$\mathcal{S} = \{\mathtt{0}, \mathtt{1}, \mathtt{2}, \mathtt{3}, \mathtt{4}, \mathtt{5}, \mathtt{6}, \mathtt{7}, \mathtt{8}, \mathtt{9}, \mathtt{a}, \mathtt{b}, \mathtt{c}, \mathtt{d}, \mathtt{e}, \mathtt{f}, \mathtt{g}, \mathtt{h}, \mathtt{i}, \mathtt{j}, \mathtt{k}, \mathtt{l}, \mathtt{m}, \mathtt{n}, \mathtt{o}, \mathtt{p}, \mathtt{q}, \mathtt{r}, \mathtt{s}, \mathtt{t}, \mathtt{u}, \mathtt{y}\}$$

(this strange alphabet has `y` instead of `v`).

Formally, she computed $Z_i \in \mathcal{S}^{1312}, 1 \leqslant i \leqslant 40$ such that

$$Z_i = (\rho(z_{i,1\ldots5}), \rho(z_{i,6\ldots10}), \ldots, \rho(z_{i,6556\ldots6560})).$$

After Nicole came back from school, she forgot all the details! She only has written all the Z_i and she also remembers the first 6432 bits of y (128 more are missing). The attachment contains the 6432-bit prefix of y on the first line and $Z_1, \ldots, Z_{40} \in \mathcal{S}^{1312}$ on the following lines, one per line.

Help Nicole to recover full y!