32031 Feedback Quiz, 2022/23, Week 08: Hamming codes

Open-book. 10–15 minutes. Not for credit. To be marked in class.

You are given a check matrix for a Hamming code over the field $\mathbb{F}_7$. Some entries are replaced by letters:

$$H = \begin{bmatrix} 1 & 1 & 2 & 3 & 4 & 3 & A & 4 \\ 2 & 5 & 6 & B & 4 & 0 & 3 & 2 \end{bmatrix}$$

Question 1   What is the code for which H is a check matrix?

○ Ham(7,2)   ○ Ham(8,7)   ○ Ham(8,2)   ○ Ham(7,5)   ○ Ham(7,7)
○ Ham(2,7)   ○ Ham(2,8)   ○ Ham(7,8)   ○ Ham(5,7)

Question 2   Entry A is

○ 0   ○ 1   ○ 2   ○ 3   ○ 4   ○ 5   ○ 6

Question 3   Entry B is

○ 0   ○ 1   ○ 2   ○ 3   ○ 4   ○ 5   ○ 6

Question 4   Eve wrote down the syndrome, $S(\underline{y}) = \underline{y}H^T$, of every vector $\underline{y} \in \mathbb{F}_7^8$. How many *distinct* syndromes did Eve obtain?

○ 56   ○ 7   ○ 48   ○ 2^7 ○ 7^5 ○ 49   ○ 8   ○ 7^8 ○ 42