

Applied Algebra

Instructions Please write your name in the upper right-hand corner of the page. Use complete sentences, along with any necessary supporting calculations, to answer the following questions.

1. A linear code has the following generator matrix:

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

How many errors does this code correct?

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2. Suppose $f: \mathbf{B}^2 \rightarrow \mathbf{B}^5$ is given by the generator matrix

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

A two-character binary word ab transmitted by this code is received with one error as 10110. What was the original word ab ?