Assignment 5

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2018-09-12, 23:59 IST.

1) A linear code has the following properties

- The sum of two codewords belonging to the code is also a codeword belonging to the code
- The all-zero codeword is always a codeword
- The minimum Hamming distance between two codewords of a linear code is equal to the minimum weight of any non-zero codeword, i.e., \( d^* = w^* \)
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above

2) Which statement of incorrect about Galois Fields

- The number of elements must be a power of prime
- Two Galois Fields with the same number of elements are isomorphic
- Every Galois Field has at least one element \( \alpha \), called a primitive element, such that all other elements (except 0) can be expressed as a power of \( \alpha \).
- If \( p \) is a prime number and \( \alpha \) is a primitive element, then with \( \alpha^p = 1 \)

No, the answer is incorrect.
Score: 0

Accepted Answers:
If \( p \) is a prime number and \( \alpha \) is a primitive element, then with \( \alpha^p = 1 \)

3) Consider the generator matrix \( G = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 \end{bmatrix} \). The \( n \times r \) matrix

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1) The generator matrix for the binary repetition code of length 5 is

\[
G = \begin{bmatrix}
1 & 1 & 1 & 1 & 1 \\
0 & 0 & 0 & 0 & 0 \\
\end{bmatrix}
\]

2) Using the Hamming code given by \[ G = \begin{bmatrix}
1 & 1 & 0 & 1 & 0 & 0 & 0 \\
0 & 1 & 1 & 0 & 1 & 0 & 0 \\
0 & 0 & 1 & 1 & 0 & 1 & 0 \\
0 & 0 & 0 & 1 & 1 & 0 & 1 \\
\end{bmatrix}\] upon encoding the input message vectors \[ m = 1010 \] we obtain the codeword

- 011010
- 111010
- 101010
- 111011

No, the answer is incorrect.
Score: 0
Accepted Answers:
111010

3) How many errors can be corrected using the (15, 11) linear block code whose parity check matrix is given below

\[
H = \begin{bmatrix}
1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 \\
0 & 1 & 1 & 0 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\
0 & 0 & 0 & 1 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\
\end{bmatrix}
\]

- 0
- 1
- 2
- 3

No, the answer is incorrect.
Score: 0
Accepted Answers:
1

4) The Hamming weight of the vector [♦ 0 ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦] is

- 5
- 6
- 7
- 8

No, the answer is incorrect.
Score: 0
Accepted Answers:
7

5) The generator matrix for the binary repetition code of length 5 is

\[
G = \begin{bmatrix}
1 & 1 & 1 & 1 & 1 \\
0 & 0 & 0 & 0 & 0 \\
\end{bmatrix}
\]
8) Let \( u = [u_1, u_2, \cdots, u_n] \), \( v = [v_1, v_2, \cdots, v_n] \) and \( w = [w_1, w_2, \cdots, w_n] \) be binary \( n \)-tuples. Which of the following is true:

- \( d(u, v) = w(u + v) \)
- \( d(u, v) \leq d(u, w) + d(w, v) \)
- \( w(u + v) \geq w(u) - w(v) \)
- All of the above

No, the answer is incorrect. 
Score: 0

Accepted Answers:
All of the above

9) Let \( G_1, G_2 \) be the generator matrices for two linear codes \((n_1, k)\) and \((n_2, k)\) respectively. Then, the parameters \((n, k)\) for the code with \( G = [G_1 \mid G_2] \) will be

- \( (n_1+n_2, k) \)
- \( (\min(n_1, n_2), k) \)
- \( (\max(n_1, n_2), k) \)
- \( (n_1+n_2, 2k) \)

No, the answer is incorrect. 
Score: 0

Accepted Answers:
\((n_1+n_2, k)\)

10) Suppose \( C \) is a binary linear code. The code obtained by adding an overall parity check bit to \( C \) will be a

- Non linear code
- Linear code
- Systematic code
- None of the above

No, the answer is incorrect. 
Score: 0

Accepted Answers:
Linear code