1. For each of the following parameters \([n, k, d]\), determine whether a binary linear code exists or not. If a code exists, write down a parity check matrix. If not, explain why.

(a) \([9, 5, 4]\)

Answer:

(b) \([16, 11, 4]\)

Answer:
2. Let \( \{a_i\}_{i=0}^{13} \) be the weight distribution of the ternary linear Hamming code of length 13. Find the sum

\[
\sum_{i=1}^{13} ia_i
\]

**Answer:**

   Answer:
In the following problems, use appropriate bounds and specific code constructions to determine the exact value $A_q(n, d)$ of the maximum number of codewords of a $q$-ary code of length $n$ and minimum distance $d$, or the exact value $B_q(n, d)$ of the maximum number of codewords of a linear $q$-ary code of length $n$ and minimum distance $d$.

4. $A_2(14, 7)$

Answer:
5. $A_3(11, 5)$.

Answer:
6. $B_2(15, 4)$.

Answer:

Answer:
8. Factor $x^8 - 1$ into irreducible polynomials over $GF(3)$.

Answer:
9. Let $\alpha$ be a primitive element of $GF(16)$. Write down the binary polynomial being the minimal polynomial of $\alpha^3$.

Answer:
10. Find the number of distinct ternary cyclic [13, 7] codes.

Answer: