

# On the Coverings of $\{0,1,2\}^n$ with Minimal Cardinality

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The paper deals with a Coding Theory problem known as the inverse football pool problem. It is about finding the minimal cardinality  $T(n)$  of a covering of  $Q_n = \{0,1,2\}^n$ . A covering is here defined as a code  $A$  with the following property: for every  $x$  in  $Q_n$  there exists  $y$  in  $A$  such that the Hamming distance  $d(x,y)$  is equal to  $n$ . The first non-trivial value of  $T(n)$  is for  $n=7$  as it is not obtained by having an equality in the recurrence relation  $T(n) \geq \frac{3}{2} T(n-1)$ . With a proof by exhaustion, compiled on a computer, David Brink has determined that  $T(7)=29$ . In our research we gain a better understanding of the very problem by proving the same result by a non-exhaustive method.