

Gold Button Problem

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Let $B_6 = \{0, 1, \dots, 5\}$ be an alphabet of size 6, $X (= B_6^7)$ the seven dimensional cube over B_6 , i.e., $X = \{(x_1, \dots, x_7) | x_i \in B_6, i = 1, 2, \dots, 7\}$. A rook located at $x = (x_1, \dots, x_7)$ can catch up a pone at $y = (y_1, \dots, y_7)$ if $x_i = y_i$ for all i with at most one exception. Determine whether we can locate rooks in X in such a way that a pone at any point of X is captured by a unique rook.