1. Problem Set 4, Problem 2. (page 62). Derandomize this version of the set discrepancy problem by the conditional probability method.

2. Derandomize the algorithm for Problem Set 5, Problem 2 when \( k = 3 \). (The randomized algorithm chooses \( n \) r.v.s which are independent and uniformly distributed in \( \{0, 1, 2\} \), and assigns vertex \( i \) to partition \( c \) if the \( i^{th} \) r.v. takes the value \( c \).)

3. Let \( p \) be any prime, and let \( X_1, X_2, \ldots, X_n \) be independent and uniformly distributed over \( \{0, 1, \ldots, p - 1\} \). Let \( a_1, a_2, \ldots, a_n \in \{0, 1, \ldots, p - 1\} \) such that \( a_1 \neq 0 \). Let \( Y_1, Y_2, \ldots, Y_n \) be defined by

\[
Y_i = \sum_{j=1}^{i} a_j X_{i-j+1}, \text{ for } 1 \leq i \leq n.
\]

Prove that \( Y_1, Y_2, \ldots, Y_n \) are independent and uniformly distributed.