DISTRIBUTIONS OF NUMBERS OF FAILURES AND SUCCESSES UNTIL THE FIRST CONSECUTIVE k SUCCESSES

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Abstract. Exact distributions of the numbers of failures, successes and successes with indices no less than l $(1 \leq l \leq k-1)$ until the first consecutive k successes are obtained for some $\{0,1\}$-valued random sequences such as a sequence of independent and identically distributed (iid) trials, a homogeneous Markov chain and a binary sequence of order k. The number of failures until the first consecutive k successes follows the geometric distribution with an appropriate parameter for each of the above three cases. When the $\{0,1\}$-sequence is an iid sequence or a Markov chain, the distribution of the number of successes with indices no less than l is shown to be a shifted geometric distribution of order $k-l$. When the $\{0,1\}$-sequence is a binary sequence of order k, the corresponding number follows a shifted version of an extended geometric distribution of order $k-l$.

Key words and phrases: Geometric distribution, discrete distributions, Markov chain, waiting time, geometric distribution of order k, iid sequence, binary sequence of order k, inverse sampling.