A NOTE ON THE SELECTION OF RANDOM-VARIABLES UNDER A SUM CONSTRAINT

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Abstract: Consider an i.i.d. sequence of non-negative random variables (X1, ..., X(n)), with known distribution F. Consider decision rules for selecting a maximum number of the X(i)'s subject to the following constraints: (1) the sum of the elements selected must not exceed a given constant c > 0, and (2) the X(i)'s must be inspected in strict sequence with the decision to accept or reject an element being final at the time it is inspected. Coffman et al. (1987) proved that there exists such a rule that maximizes the expected number E(n)(c) of variables selected, and determined the asymptotics of E(n)(c) for special distributions. Here we determine the asymptotics of E(n)(c(n)) for very general choices of sequences (c(n)) and of F, by showing that E(n)(c) is very close to an easily computable number. Our proofs are (somewhat deceptively) very simple, and rely on an appropriate stopping-time argument.

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