Seminar Presentation
Summer Mathematics
Research Experience for Undergraduates

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Title

Refilling Fixed-Capacity Containers

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Abstract

Suppose that we have N containers of capacity d, and that from each of M randomly selected of these ($0 < M < N$) we retrieve one item. This retrieval process is repeated indefinitely, and every container that becomes empty is replenished to full capacity before the retrieval process continues. What is the number of containers that need replenishment when the retrieval process has occurred n times? Of course, this number cannot be known deterministically (if $d \geqslant 2$) because of the randomness involved. But, as a result of the theorem we discuss in this talk, asymptotically in n, the number tends to M/d. The theorem applies to a more general retrieval and refilling process, and is relevant to inventory management and other activities where one would be concerned with the steady-state pace of replenishing fixed-capacity containers.

Reference

Gilles Gnacadja : *Asymptotic Equidistribution of Congruence Classes with respect to the Convolution Iterates of a Probability Vector*
Statistics and Probability Letters, Volume 82, Issue 10, October 2012, Pages 1849-1852
http://dx.doi.org/10.1016/j.spl.2012.05.025