

Pitman's $2M-X$ Theorem for Skip-Free Random Walks with Markovian Increments

B. M. Hambly, *University of Oxford*
 James B. Martin, *Cambridge University*
 Neil O'Connell, *BRIMS, HP Labs*

Abstract

Let $(\xi_k, k \geq 0)$ be a Markov chain on $\{-1, +1\}$ with $\xi_0 = 1$ and transition probabilities $P(\xi_{k+1} = 1 | \xi_k = 1) = a > b = P(\xi_{k+1} = -1 | \xi_k = -1)$. Set $X_0 = 0$, $X_n = \xi_1 + \dots + \xi_n$ and $M_n = \max_{0 \leq k \leq n} X_k$. We prove that the process $2M-X$ has the same law as that of X conditioned to stay non-negative.

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