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Positivity of integrated random walks

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Take a centered random walk S_n and consider the sequence of its partial sums $A_n = S_1 + ... + S_n$. Suppose S_1 is in the domain of normal attraction of an \alpha-stable law with 1 < \alpha <= 2. Assuming that S_1 is either right-exponential (that is P(S > x | S > 0)=e^{-ax} for some a > 0 and all x > 0) or right-continuous (skip free), we prove that $p_N = P(A_1 > 0, ..., A_N > 0) \sim C_\alpha N^{1/(2\alpha) - 1/2}$ as N tends to infinity, where $C_\alpha > 0$ depends on the distribution of the walk. We also consider a conditional version of this problem and study positivity of integrated discrete bridges.

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