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CORRECTION TO "ON THE RANGE OF RECURRENT MARKOV CHAINS"

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In the above paper, our computation for the tail of the distribution of W in the random walk case (Theorem 2) is incorrect ((2.2) was erroneously applied to III). As a consequence, Corollary 1, which asserts that random walks satisfy (1.3), is wrong. It is therefore desirable to state the following variation on Theorem 1:

THEOREM 1′. *In the nullrecurrent case* ($\pi(\Omega) = \infty$), *if there exists an* r, $0 < r \leqslant 1$ *with* $EW^r < \infty$, *and if* $kN_k^{-r} \to 0$, *then* (1.2) *is true.*

The proof follows from adapting (1.7) and (1.8) to the inequality $N_k^{-r} \cdot R_{N_k}^r \leqslant (k^{-1}\Sigma_{j=1}^k W_j^r) \cdot (kN_k^{-r})$. Theorem 1 is obtained when $r = 1$, and then $kN_k^{-1} \to 0$ is automatic.

It has been pointed out to us that a counterexample to Corollary 1 is provided by simple symmetric random walk on the integers. In that case $E_0 W = 1 + E_1 U$, where $U = \max_{n \leqslant N} X_n$ and $P(U \geqslant k) = k^{-1}$, the probability of the classical gambler's ruin, and so $E_0 W = \infty$. We note, however, that $E_0 W^r < \infty$ for any r with $0 < r < 1$, and since N_k grows as k^2, the hypotheses of Theorem 1′ are satisfied for $r = \frac{2}{3}$, say. We think a large number of nullrecurrent chains will satisfy the conditions of Theorem 1′.

It has also been pointed out that the chain in Section 3 is transient, not recurrent as claimed. In the definition of the transition probabilities both 2^{-n} and $1 - 2^{-n}$ should be replaced by $\frac{1}{2}$. Also, in the last line of page 685, the second equality should be an inequality, and following that we should have equality.

REFERENCES

[1] CHOSID, LEO and ISAAC, RICHARD (1978). On the range of recurrent Markov chains. *Ann. Probability* **6** 680–687.

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