

DISTRIBUTION OF THE LENGTH AND THE HEIGHT OF THE REGENERATION CYCLE FOR A RANDOM WALK WITH DRIFT

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Consider a simple random walk with jumps of $+1$ and -1 and non-zero drift provided that its trajectory does not take negative values within the infinite time interval. Such a random walk has a regenerative structure generated by the time instants when all previous values are smaller and all future values are not smaller than the current one. We analyse the distributions of the length and the height of a typical regenerative cycle of the process. We show that this analysis may be reduced to a combinatorial problem of finding the so-called “indecomposable” paths. We give recursive relations that allow us to calculate the distributions of the length and the height of the regeneration cycle.