

# Number of appearances of events in random sequences: a new generating function approach to *Type II* and *Type III* runs

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**Abstract** Distributions of runs of length at least  $k$  (*Type II* runs) and overlapping runs of length  $k$  (*Type III* runs) are derived in a unified way using a new generating function approach. A new and more compact formula is obtained for the probability mass function of the *Type III* runs.

**Keywords** Runs statistics · Generating function · Asymptotic distributions · Factorial moments · Wilf-Zeilberger method

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