

CHARACTERISATIONS OF THE GEOMETRIC DISTRIBUTION USING
DISTRIBUTIONAL PROPERTIES OF THE ORDER STATISTICS

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Abstract: Let X_1, X_2, \dots, X_N be independent, identically distributed, non-negative integer valued random variables and let

$$X_{1:N} \leq X_{2:N} \leq \dots \leq X_{N:N}$$

denote the corresponding order statistics. If $P(X_{1:N} \geq k) = P(X_1 \geq Nk)$ for all $N \geq 1$ and $k = 1$, then the distribution of X_1 is geometric. We modify this distributional property of the order statistics in several directions to obtain characterisations of the geometric distribution. We provide examples to show that the assumptions, in some respect, cannot be weakened any further.

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