BRIEF ARTICLE

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Chernoff Bound for Geometric Variables.

Theorem 0.1. *Consider some fixed $0 < \delta < 1$. Suppose $X_1, ..., X_n$ are indep.. r.v.'s on $\mathbb{N}$ with $P(X_i = k) = (1-\delta)^{k-1}\delta$ for every $k \in \mathbb{N}$. Let $X = \sum X_i$, $\mu = E(X)$. Then it holds for every $\epsilon > 0$ that*

$$P(X \geq (1+\epsilon)n/\delta) \leq e^{-\epsilon^2 n/2(1+\epsilon)}$$

Chernoff with Variables with Exponential Tails

Theorem 0.2. *Suppose $X_1, ..., X_n$ are indep. geometric. r.v.'s on $\mathbb{N}$, such that there is a constant $\gamma > 0$ with $P(X_i = k) \leq \gamma(1-\delta)^{k-1}$ for every $k \in \mathbb{N}$. Let $X = \sum X_i$, $\mu = E(X)$. Then it holds for every $\epsilon > 0$ that*

$$P(X \geq (1+\epsilon)\mu + O(n)) \leq e^{-\epsilon^2 n/2(1+\epsilon)}$$