

Homework of Week 6

Deadline: 9:00am, November 4 (Thursday), 2021

1. Let X_1, \dots, X_n be independent and identically distributed Poisson random variables and $X = \sum_{i=1}^n X_i$. Let \mathcal{E} be the event that all X_i 's are nonzero. Prove that $\Pr(\mathcal{E}|X = k)$ increases with k .
2. Let X_1, \dots, X_n be independent and identically distributed Poisson random variables and $X = \sum_{i=1}^n X_i$. Let \mathcal{E} be the event that all X_i 's are nonzero. We know that $\Pr(\mathcal{E}|X = k)$ increases with k . Prove that for any $0 < k_1 < k_2$, $\Pr(\mathcal{E}|X = k_1) \leq \Pr(\mathcal{E}|X \in [k_1, k_2])$.
3. Do Bernoulli experiment for 20 trials, using a new 1-Yuan coin. Record the result in a string $s_1 s_2 \dots s_i \dots s_{20}$, where s_i is 1 if the i^{th} trial gets Head, and otherwise is 0.