UC Berkeley
Department of Electrical Engineering and Computer Sciences

EE126: Probability and Random Processes

Problem Set 4
Fall 2018

Issued: Wednesday, September 12, 2018 **Due:** For your own practice

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Problem 1. **Poisson Bounds**
Let X be the sum of 20 i.i.d. Poisson random variables $X_1, \ldots, X_{20}$ with $\mathbb{E}[X_1] = 1$. Use Markov's Inequality and Chebyshev's Inequality to find an upper bound of $\Pr(X \geq 26)$.

Problem 2. **Convergence of Exponentials**
Let $X_1, X_2, \ldots$ be i.i.d. $\text{Exp}(\lambda)$ random variables. Show that

$$\frac{X_n}{\ln n} \to 0 \qquad \text{in probability as } n \to \infty.$$

Problem 3. **Transform Practice**
Consider a random variable Z with transform

$$M_Z(s) = \frac{a - 3s}{s^2 - 6s + 8}, \qquad \text{for } |s| < 2.$$

Calculate the following quantities:

1. The numerical value of the parameter a.
2. $\mathbb{E}[Z]$.
3. $\text{Var}(Z)$.