

STU22004 – Sample Questions 6

1. Chebyshev's inequality - For random variable X with mean μ and standard deviation σ , prove that

$$P(|X - \mu| \geq k\sigma) \leq \frac{1}{k^2}$$

2. Find the value of α for which $E[(X - \alpha)^2]$ is minimum.
3. If the mean time between arrival of two consecutive cars to a petrol station is 2 minutes, find the probability function of the number of cars that arrive in 1 hour.
4. If X has exponential distribution with mean 2, find $P(X \geq 2 | X \leq 8)$.
5. If $f(x) = 2x$, $0 \leq x \leq 2$, find the median.
6. Three points A, B and C are chosen on a line randomly. What is the probability that point B is chosen between A and C?
7. X_1, X_2, \dots, X_n are iid RVs with $P(X = e^{-1}) = P(X = e^2) = \frac{1}{2}$, find $E(\prod_{i=1}^n X_i)$.
8. If $f(x) = 1 - |x|$, $-1 < x < 1$, find $Var[X]$.
9. If the moment generating function of RV X is given as $m_X(t) = e^{3t + \frac{t^2}{4}}$, find $P(X > 3)$.
10. For the random variable X with $f(x) = cx^d e^{-\frac{x}{3}}$, $x \geq 0$ and $E[X] = 9, Var[X] = 27$, find c and d .