

EE 693 Quiz 1 Maximum Marks: 20

Time: 40 minutes

Date 10.9.21

Q.1 Suppose $\{A_n\}_{n=1}^{\infty}$ is a sequence of subsets of \mathbb{R} given by $A_n = [1, 5 - \frac{1}{n}]$. Find $\liminf_{n \rightarrow \infty} A_n$.

Q.2. Suppose $\{X_n\}$ is a sequence of independent random variables with $P(\{X_n = n\}) = \frac{1}{n}$ and

$P(\{X_n = 0\}) = 1 - \frac{1}{n}$. Examine if (a) $\{X_n\} \xrightarrow{P} \{X = 0\}$ as $n \rightarrow \infty$ and (b)

$\{X_n\} \xrightarrow{m.s.} \{X = 0\}$ as $n \rightarrow \infty$

Q.3 $\{X_n\}$ is a sequence of independent Bernoulli random variables with $P(\{X_n = 1\}) = \frac{1}{4}$ and

$P(\{X_n = 0\}) = \frac{3}{4}$ and $S_n = \sum_{i=0}^n X_i$. To what value $\frac{S_n}{n}$ converges in probability as $n \rightarrow \infty$?

Q.4 . Consider a random variable X with the moment generating function $M_X(s) = e^{\frac{s^2}{2}}$. For the random variable X , find the Chernoff bounds on $P(\{X \geq 3\})$.