

Information and Communication

Quiz 1

22nd April, 2022

Total: 10 marks

Problem 1 Consider a band-limited signal $x(t)$ which can be sampled at Nyquist rate of ω_0 for perfect reconstruction. What is the Nyquist rate of the following signals (i) $x^2(t)$ (ii) $x(t) + x(t-1)$. Please justify.

(4 marks)

Problem 2 If \mathcal{F}_1 and \mathcal{F}_2 are two event spaces based on a sample space S , is the union $\mathcal{F}_1 \cup \mathcal{F}_2$ also an event space? Please justify.

(3 marks)

Problem 3 Let a and b be two points chosen independently and uniformly at random in the interval $[0,1]$. What is the probability that the ratio $\frac{a}{b}$ lies between 1 and 2?

(3 marks)