ESMA 6787: Exam 2

Due on December 14, 2025

Israel Almodovar

Alejandro Ouslan

Problem 1: Acceptance of Syllabus

I have read the syllabus, understand its contents, and have no questions.

Problem 2: Definitions

(a) **Sample Space:**
(b) **Kolmgorov Axioms of Probability:**
(c) **Exponential family:**
(d) **Convergence in distribution:**
(e) **Convergence in Probability:**
(f) **Almost sure convergence (or convergence with probability 1):**
(g) **Weak law of large numbers:**
(h) **Strong law of large numbers:**
(i) **Characteristics functions:**

Problem 3:

Show that each of the following families of distributions is an exponential family,

(a) The family of Bernoulli distribution with a unknown value of the parameter p.
(b) The family of Poisson distributions with an unknown mean
(c) The family of negative binomial dstributions for which the value of r is known and the value of p is unknown.
(d) The family of normal distributions with an unknown mean and a known variance.
(e) The family of normal distributions with an unknown variance and a known mean.
(f) The family of gamma distributions for which the value of α is unknown and the value of β is known.
(g) The family of gamma distributions for which the value of α is known and the value of β is unknown.
(h) The family of beta distributions for which the value of α is unknown and the value of β is known.
(i) The family of beta distributions for which the value of α is known and the value of β is unknown.