EECS 861
Test 1
Topics Fall 2023

Probability

Axioms
Random Variables
    Discrete
    Continuous
    Mixed
Distributions
    Marginal
    Joint
    Conditional
    Bayes Rule
Expect Value
    Mean
    Variance
    Covariance
    Correlation coefficient
Characteristic and moment generating functions
Random vectors
    Mean Vector
    Covariance Matrix
    Multivariate Gaussian RVs
        Linear Transformations of Multivariate Gaussian RVs
        Linear transformation to form i.i.d. Gaussian components
        Conditional Probabilities
Nonlinear Transformations of RVs
Bounds and Approximations
    Chebyshev Inequality
    Chernoff Bound
Sequences of RV's
    Central Limit Theorem

Random Processes

Definition
Autocorrelation function- $R_{xx}(t_1,t_2)$
Autocorrelation function $R_{XX}(\tau)$
    Properties of $R_{XX}(\tau)$
    Finding μ_X and σ_X given $R_{XX}(\tau)$
Example RPs
    Cosine RP
    Random Binary Waveform
    Markov Processes
    Gaussian Processes
Stationarity
    SSS
    WSS