Assignment Solution

Vijay Soren

2024-01-31

1.

Answer

Y_N will follow $Binomial(N, \theta)$ With $E(Y_N) = N\theta$, $Var(Y_N) = N\theta * (1 - \theta)$ and $\bar{Y}_N$ will follow $Binomial(N, \theta)$ with $E(\bar{Y}_N) = \theta$,
$Var(\bar{Y}_N) = (\theta * (1 - \theta))/N$ and Support of $\bar{Y}_N$ is $[0, 1]$

2.

Answer:

X_N will follow $Gamma(N\alpha, N\lambda)$

3.

Answer:

fx is valid pdf

4.

Answer:

The joint distribution of $X = (X1, \ldots, XT)^{/}$ is multivariate Normal distribution with $E(X) = 0$. The covariance matrix $\mathbf{\Sigma}$ will have entries of $\rho^{|i-j|}$ on the diagonal and $\rho^{|i-j|-1}$ elsewhere.Where i , j are row and column $\mathbf{\Sigma}$

The conditional distribution of Xt given $X_1, \ldots, X_t - 1, X_t + 1, \ldots, X_T$
$\sim \mathcal{N}(\rho X_{t-1}, 1 - \rho^2)$

5.

Answer:

6.

Answer:

> The conditional distribution of X given $Y_1, \ldots, Y_T$ will follow $Gamma(\sum_{i=1}^{T} Y_i + a, T + b)$.