1. How would you make sense of the statement, "we can get *binomial distribution* as a limit of *hypergeometric distribution*"?

    [8]

2. Let $X_1, \ X_2, \cdots, X_n$ be a random sample from the distribution with *pdf* given by

$$f\left(x|\theta_1, \theta_2\right) = \frac{1}{\theta_2 - \theta_1} I_{(\theta_1, \theta_2)}\left(x\right); \ \theta_1 < \theta_2 \in I\!\!R$$

    Find *maximum likelihood estimators (MLE)* for θ_1 and θ_2. Find the mean of the distribution and obtain *method of moments* (MOM) estimator for it.

    $[6 + (2 + 4) = 12]$

3. If $X_1, \ X_2$ are independent $Gamma(a, \lambda)$ and $Gamma(b, \lambda)$ random variables; λ, a and b all positive, then find the distribution of $Y = \frac{X_1}{X_2}$. Based on $Y_1, Y_2, \cdots, Y_n$; a random sample from the distribution of Y, find *method of moments* (MOM) *estimators* for λ, a and b. If $\lambda > 0$ and a, b positive integers; were all known then explain how you would generate observations on Y.

    $[8 + (2 + 3 + 3) + 6 = 22]$

4. Explain how you would generate observations, using a coin, from uniform distribution on $\{1, 2, \cdots, N\}$, where N is a known positive integer.

    [10]

5. Let $X_1, \ X_2, \cdots, X_n$ be a random sample from the $Poisson(\lambda), \lambda > 0$ distribution. Find *(MLE)* for λ when *a)* there is no nonzero observation, *b)* there is at least one nonzero observation.

    $[3 + 5 = 8]$