

Exercise

1. Suppose X_1, X_2, \dots, X_n is a random sample from an exponential distribution with the unknown parameter λ . **Using two methods** (the methods of moment and maximum likelihood) to estimate λ .

2. Let X_1, \dots, X_n be a random sample from a gamma distribution with parameters α and β . Its pdf is

$$f(x; \alpha, \beta) = \begin{cases} \frac{1}{\beta^\alpha \Gamma(\alpha)} x^{\alpha-1} e^{-\frac{x}{\beta}} & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Determine the moment estimators of parameters α and β .

(Given that $E(X) = \alpha\beta$, $V(X) = \alpha\beta^2$)

3. Let X_1, X_2, \dots, X_n is a random sample from a normal distribution $N(\mu, \sigma^2)$. Determine the maximum likelihood estimator of μ and σ^2 .

4. The alternating-current breakdown voltage of an insulating liquid indicates its dielectric strength. Given the accompanying sample observations on breakdown voltage of a particular circuit under certain conditions.

62	50	53	57	41	53	55	61	59	64	50	53	64	62	50	68
54	55	57	50	55	50	56	55	46	55	53	54	52	47	47	55
57	48	63	57	57	55	53	59	53	52	50	55	60	50	56	58

Please find 95% confidence interval.

5. Consider the following sample of fat content (in percentage) of $n=10$ randomly selected hot dogs:

25.2 21.3 22.8 17.0 29.8 21.0 25.5 16.0 20.9 19.5

Assume that these were selected from a normal population distribution. Please find 95% Confidence Interval for the population mean fat content.