HABIB UNIVERSITY

Midterm-I Exam (max pt. 100)
Dr. Shafayat Abrar
CE 362: Statistics and Inferencing

Timing: 05:00 - 07:00 PM
Dated: Dec. 08, 2023
Duration: 120 min

Q1 [70]: Consider i.i.d. random variables $X_1, \ldots, X_n$ sampled from the distribution with probability density

$$f(x \mid \theta) = K\theta^3\sqrt{x}e^{-\theta^2 x}, \qquad x > 0$$

and 0 elsewhere.

(a) Find K.

(b) Compute the method of moment estimator for θ; denote it as $\widehat{\theta}_{\text{MoM}}$.

(c) Using Taylor's series, compute the bias of the estimator, $\widehat{\theta}_{\text{MoM}}$.

(d) Using Taylor's series, compute the variance of the estimator, $\widehat{\theta}_{\text{MoM}}$.

(e) Compute the maximum likelihood estimator for θ; denote it as $\widehat{\theta}_{\text{ML}}$.

(f) Using Taylor's series, compute the bias of the estimator, $\widehat{\theta}_{\text{ML}}$.

(g) Compute the asymptotic variance of the estimator $\widehat{\theta}_{\text{ML}}$.