3. Method of moments estimators

For each of the following distributions, give the method of moments estimator in terms of the sample averages $\overline{X}_n$ and $\overline{X_n^2}$, assuming we have access to n i.i.d. observations $X_1, \ldots, X_n$. In other words, express the parameters as functions of $\mathbb{E}[X_1]$ and $\mathbb{E}[X_1^2]$ and then apply these functions to $\overline{X}_n$ and $\overline{X_n^2}$.

(a)

1/1 point (graded)

$$X_i \sim \text{Ber}(p), \quad p \in (0,1)$$

(If applicable, write **barX_n** for $\overline{X}_n$.)

Method of moments estimator $\hat{p} =$ barX_n □

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□ 正确 (1/1 分)

(b)

1/1 point (graded)

$$X_i \sim \text{Poiss}(\lambda), \quad \lambda > 0,$$

which means that each X_1 has density

$$\mathbf{P}_\lambda(X = k) = e^{-\lambda}\frac{\lambda^k}{k!}, \quad k \in \mathbb{N}.$$

Method of moments estimator $\hat{\lambda} =$ barX_n □

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□ 正确 (1/1 分)

(c)

1/1 point (graded)

$$X_i \sim \text{Exp}(\lambda), \quad \lambda > 0,$$

which means that each X_1 has density

$$f_\lambda(x) = \lambda e^{-\lambda x}, \quad x > 0.$$

Method of moments estimator $\hat{\lambda} =$ 1/ barX_n

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正确 (1/1 分)

(d)

2/2 points (graded)

$$X_i \sim \mathcal{N}(\mu, \sigma^2), \quad \mu \in \mathbb{R}, \sigma^2 > 0,$$

which means that each X_1 has density

$$f_{\mu,\sigma^2}(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right).$$

(If applicable, enter **barX_n** for $\overline{X}_n$ and **bar(X_n^2)** for $\overline{X_n^2}$.)

Method of moments estimator $\hat{\mu} =$ barX_n

Method of moments estimator $\widehat{\sigma^2} =$ bar(X_n^2) - barX_n^2

STANDARD NOTATION

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正确 (2/2 分)

(e)

2 points possible (graded)

X_i follows a shifted exponential distribution with parameters $a \in \mathbb{R}$ and $\lambda > 0$. That means each X_i has density

$$f_{a,\lambda}(x) = \lambda e^{-\lambda(x-a)} \mathbf{1}\{x \geq a\}, \quad x \in \mathbb{R}.$$

(If applicable, enter **barX_n** for $\overline{X}_n$ and **bar(X_n^2)** for $\overline{X_n^2}$.)

Method of moments estimator $\hat{a} =$

Method of moments estimator $\widehat{\lambda} =$

STANDARD NOTATION

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讨论

隐藏讨论

主题： Unit 3 Methods of Estimation:Homework 6 Maximum Likelihood Estimation and Method of Moments / 3. Method of moments estimators

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□	[Staff] e) Strange behavior of grader rendering. After inputting `sqrt` in one of the fields, the first rendering window stop working and the second one shows `math rendering error`. Page refresh doesn't help. ...	5
□	e) Just to make sure 1) Does barX_n denote the sample mean of the shifted exponential distribution? 2) Does bar(X_n^2) denote the sample mean of each realization of the shifted ...	2
□	a), b), c) There is a problem with **barX_n** rendering.	2
□	[staff] bar(X_n^2) is not accepted. bar(X_n^2) is not accepted . Message is "Invalid Input: X_n not permitted in answer as a variable".	3