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3. Method of moments estimators

For each of the following distributions, give the method of moments estimator in terms of the sample averages \bar{X}_n and $\overline{X_n^2}$, assuming we have access to n i.i.d. observations X_1, \dots, 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 \bar{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 \bar{X}_n .)

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

barX_n



Submit

You have used 1 of 3 attempts

(b)

1/1 point (graded)

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

which means that each X_1 has the pmf

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

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

barX_n



Submit

You have used 1 of 3 attempts

(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 $\hat{\lambda} =$ ✓

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You have used 1 of 3 attempts

(d)

2.0/2 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 $\hat{\mu} =$ ✓

Method of moments estimator $\hat{\sigma}^2 =$ ✓

STANDARD NOTATION

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You have used 1 of 3 attempts

(e)

2/2 points (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 \bar{X}_n and **bar(X_n^2)** for $\overline{X_n^2}$.)

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

Method of moments estimator $\hat{\lambda} =$ ✓

STANDARD NOTATION

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You have used 2 of 3 attempts

✓ Correct (2/2 points)

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8

💬 [Typo: b\) \$X_1\$ has density ...](#)
[It is discrete.](#)

2

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