

Statistical Methods in Particle Physics

Quiz on chapter 5: Parameter Estimation

Prof. Dr. Klaus Reygers (lectures)
Dr. Sebastian Neubert (tutorials)

Heidelberg University
WS 2017/18

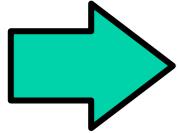
Please connect to

<http://pingo.upb.de/276848>

An estimator is biased if

- 1.** the number of data points is finite
- 2.** its expectation value differs from the true value
- 3.** it is a maximum likelihood estimator
- 4.** it has a large variance

An estimator is biased if

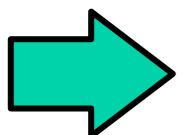
- 
- 1.** the number of data points is finite
 - 2.** its expectation value differs from the true value
 - 3.** it is a maximum likelihood estimator
 - 4.** it has a large variance

To obtain an unbiased estimate of the variance of a data sample one has to divide $\sum_{i=1}^n (x_i - \bar{x})^2$ by

- 1.** n
- 2.** n^2
- 3.** $n(n-1)$
- 4.** $n-1$

To obtain an unbiased estimate of the variance of a data sample one has to divide $\sum_{i=1}^n (x_i - \bar{x})^2$ by

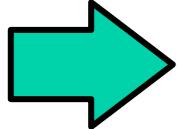
- 1.** n
- 2.** n^2
- 3.** $n(n-1)$
- 4.** $n-1$



The variance of a chi-squared estimator for one parameter is related to

- 1.** the first derivative of the chi-squared function
- 2.** the second derivative of the chi-squared function
- 3.** the logarithm of the chi-squared function
- 4.** the integral of the chi-squared from the measured value to infinity

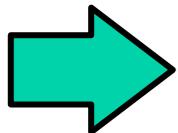
The variance of a chi-squared estimator for one parameter is related to

- 
1. the first derivative of the chi-squared function
 2. the second derivative of the chi-squared function
 3. the logarithm of the chi-squared function
 4. the integral of the chi-squared from the measured value to infinity

In the large sample limit the likelihood function L approaches a

- 1.** Gaussian
- 2.** parabolic function
- 3.** chi-squared distribution
- 4.** logarithmic function

In the large sample limit the likelihood function L approaches a

- 
- 1.** Gaussian
 - 2.** parabolic function
 - 3.** chi-squared distribution
 - 4.** logarithmic function

The variance of a maximum likelihood estimator for one parameter θ as obtained from the minimum variance bound is given by

1. $V[\hat{\theta}] = - \left. \frac{\partial \ln L}{\partial \theta} \right|_{\theta=\hat{\theta}}$

2. $V[\hat{\theta}] = - \left. \frac{\partial^2 \ln L}{\partial^2 \theta} \right|_{\theta=\hat{\theta}}$

3. $V[\hat{\theta}] = - \frac{1}{\left. \frac{\partial \ln L}{\partial \theta} \right|_{\theta=\hat{\theta}}}$

4. $V[\hat{\theta}] = - \frac{1}{\left. \frac{\partial^2 \ln L}{\partial^2 \theta} \right|_{\theta=\hat{\theta}}}$

The variance of a maximum likelihood estimator for one parameter θ as obtained from the minimum variance bound is given by

1. $V[\hat{\theta}] = - \left. \frac{\partial \ln L}{\partial \theta} \right|_{\theta=\hat{\theta}}$

2. $V[\hat{\theta}] = - \left. \frac{\partial^2 \ln L}{\partial^2 \theta} \right|_{\theta=\hat{\theta}}$

3. $V[\hat{\theta}] = - \left. \frac{1}{\frac{\partial \ln L}{\partial \theta}} \right|_{\theta=\hat{\theta}}$

4. $\rightarrow V[\hat{\theta}] = - \left. \frac{1}{\frac{\partial^2 \ln L}{\partial^2 \theta}} \right|_{\theta=\hat{\theta}}$