

Assignment 3 Template

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Problem 2: Fill in the information below based on your data which were generated using your ID number as the seed for the random number generator.

n = 20

theta = 5

The first 10 approximate 95% confidence intervals are:

[,1] [,2]

[1,] 3.535812 9.053183

[2,] 3.934067 10.072884

[3,] 2.428600 6.218248

[4,] 2.343656 6.000756

[5,] 2.523774 6.461935

[6,] 3.173387 8.125220

[7,] 3.177203 8.134991

[8,] 3.499099 8.959180

[9,] 3.247867 8.315919

[10,] 2.239389 5.733789

**Do all 10 intervals contain only values greater than 0?
YES/NO**

Yes

Depending on the value of θ is it possible that some intervals will not contain only values greater than 0? Why or why not?

Yes because 5% of the intervals in a 95% confidence interval may be wrong.

The proportion of approximate 95% confidence intervals which contain the true value of $\theta = 0.927$

How close is this proportion to 0.95? What are the reasons for this?

This differs by about 2%, a small but noticeable amount, due to the small sample size

The first ten 15% likelihood intervals (approximate 95% likelihood intervals) are:

[,1] [,2]

[1,] 4.193622 10.067219

[2,] 4.665969 11.201143

[3,] 2.880421 6.914727

[4,] 2.779675 6.672873

[5,] 2.993302 7.185711

[6,] 3.763770 9.035310

[7,] 3.768297 9.046176

[8,] 4.150078 9.962687

[9,] 3.852106 9.247371

[10,] 2.656010 6.376001

Do all your 10 intervals only contain values greater than 0? YES/NO

Yes

Depending on the value of theta is it possible that some likelihood intervals will not contain only values greater than 0? Why or why not?

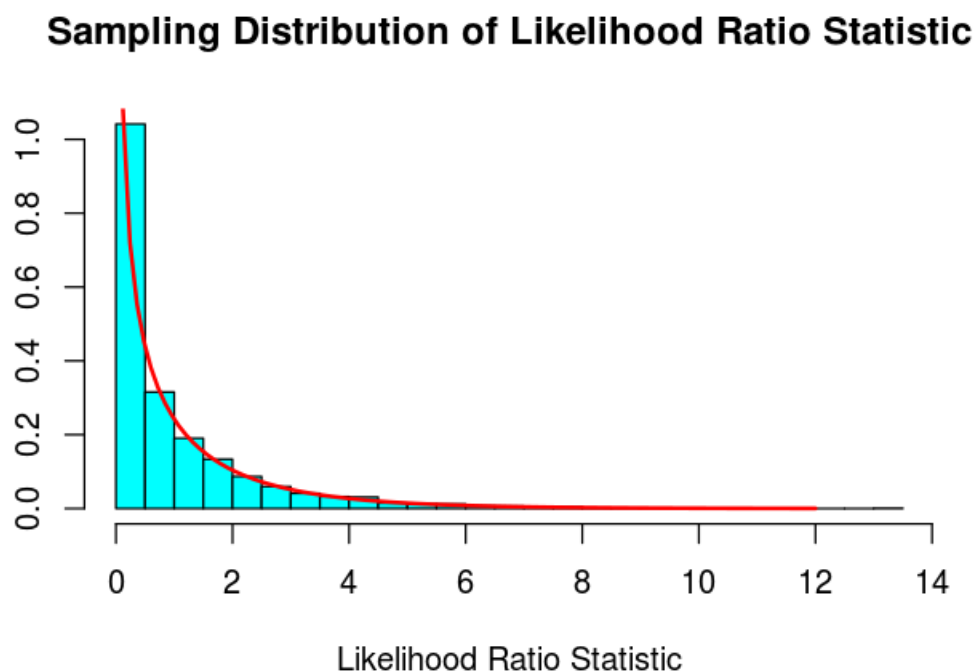
Yes, because the 15% likelihood interval of the sample chosen may be offset by the sample chosen.

The proportion of 15% likelihood intervals which contain the true value of theta = 0.945

How close is this proportion to 0.95? What are the reasons for this?

This differs by about 0.5, since likelihood intervals are a better method for estimating likely bounds for parameter θ than confidence intervals when the sample size is small.

Insert the plot of the sampling distribution of the likelihood ratio statistic for $n=20$ here.



For Exponential data the likelihood ratio statistic is a discrete or continuous random variable?

Continuous R.V.

How well does the Chi-squared(1) probability density function agree with the sampling distribution of the likelihood ratio statistic as approximate by the relative frequency histogram?

The fit between the Chi-square probability density function and the likelihood ratio is very good.