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<u>Problem 2:</u> 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 = 3

The first 10 approximate 95% confidence intervals are:

[,1] [,2]

[1,] 1.339708 3.430221

[2,] 1.797850 4.603260

[3,] 1.523231 3.900118

[4,] 1.685193 4.314811

[5,] 1.590644 4.072725

[6,] 1.980463 5.070826

[7,] 1.421804 3.640424

[8,] 1.862120 4.767818

[9,] 1.601686 4.100998

[10,] 1.987589 5.089072

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Do all 10 intervals contain only values greater than 0? YES

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

It is not true that depending on the value of n and theta is it possible that some intervals will not contain only values greater than 0 because intervals depend on value of theta, and theta cannot be negative, so some intervals always contain values greater than 0

The proportion of approximate 95% confidence intervals which contain the true value of theta = 0.9282

What factors affect how close this proportion is to 0.95? Under what circumstances might you expect this proportion to be close to 0.95, and under what circumstances would you expect this proportion to be not as close to 0.95?

A number of experiments will affect this proportion. If a number of experiments is large, each time a 95% confidence interval for theta is constructed using data, then approximately 95% of these constructed intervals would contain the true theta. If a number of experiments is small, it will affect this proportion to be not as close to 0.95 and vice versa. In this case, theta = 0.9282 is close to 0.95 but not equal

because we only constructed 10 intervals which is not a large number of experiments, so it is not close to 0.95

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

[,1] [,2]

[1,] 1.588949 3.814459

[2,] 2.132325 5.118897

[3,] 1.806616 4.336992

[4,] 1.998710 4.798137

[5,] 1.886571 4.528933

[6,] 2.348912 5.638838

[7,] 1.686320 4.048208

[8,] 2.208552 5.301888

[9,] 1.899667 4.560374

[10,] 2.357364 5.659128

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Do all your 10 intervals only contain values greater than 0? 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?

It is not true that depending on the value of theta is it possible that some intervals will not contain only values greater than 0 because intervals depend on value of theta, and theta cannot be negative, so some intervals always contain values greater than 0

The proportion of 15% likelihood intervals which contain the true value of theta = 0.951

What factors affect how close this proportion is to 0.95? Under what circumstances might you expect this proportion to be close to 0.95, and under what circumstances would you expect this proportion to be not as close to 0.95?

A number of experiments will affect this proportion. If a number of experiments is large, each time a 95% confidence interval for theta is constructed using data, then approximately 95% of these constructed intervals would contain the true theta. If a number of experiments is small, it will affect this proportion to be not as close to 0.95 and vice versa. In this case, theta = 0.951 is close to 0.95

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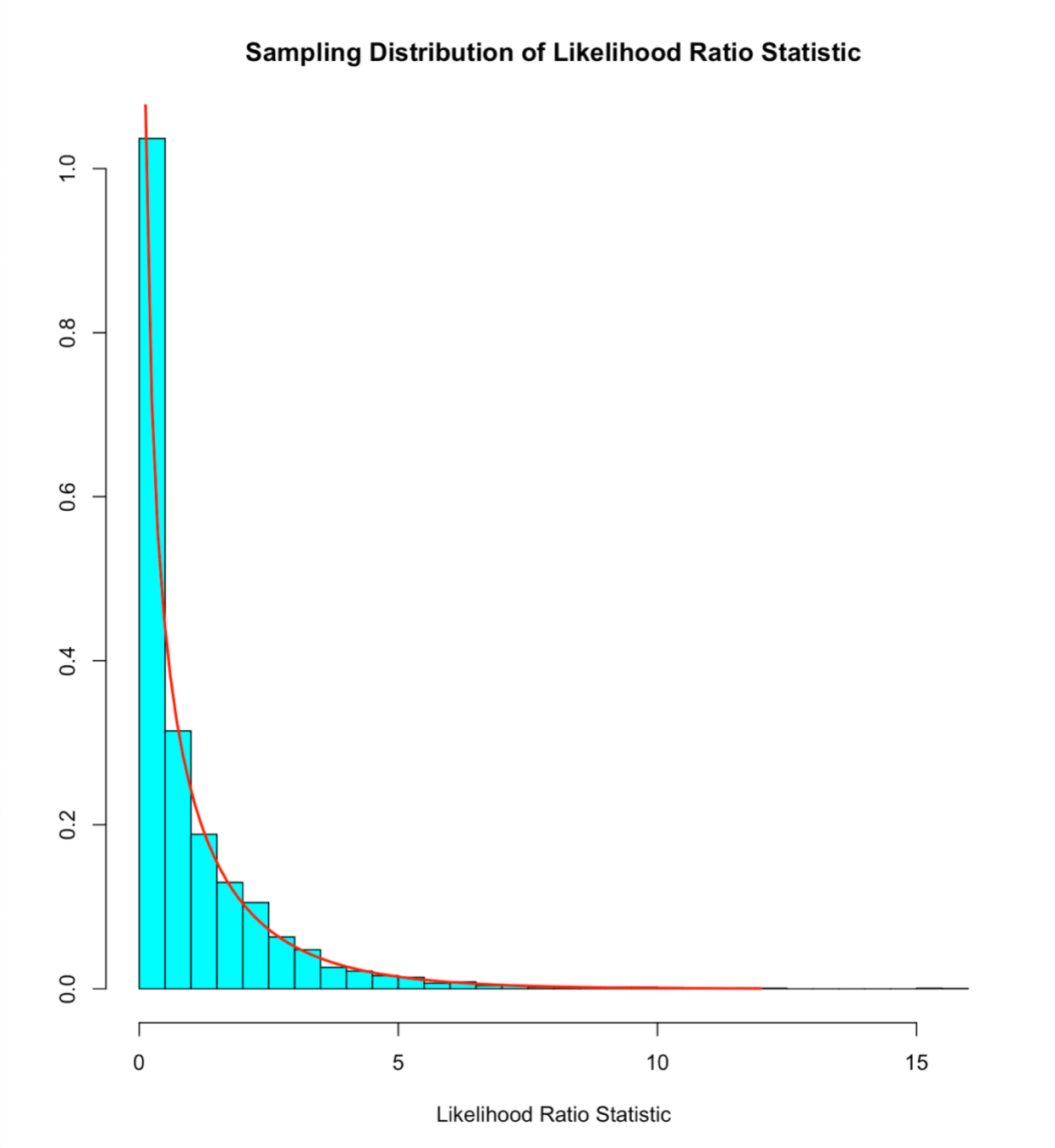
Insert the plot of the sampling distribution of the likelihood ratio statistic for n=20 here.



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

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?

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