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Lesson 4

Back to Week 2

6/6 points earned (100%)

Quiz passed!

1 / 1 points

For Questions 1-3, consider the following scenario:

In the example from Lesson 4.1 of flipping a coin 100 times, suppose instead that you observe 47 heads and 53 tails.

1. • Report the value of $\hat{p}$, the MLE (Maximum Likelihood Estimate) of the probability of obtaining heads.

0.47

Correct Response

This is simply 47/100, the number of successes divided by the number of trials.

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1 / 1 points

2.

Coin flip:

Using the central limit theorem as an approximation, and following the example of Lesson 4.1, construct a 95% confidence interval for p, the probability of obtaining heads.

- Report the lower end of this interval and round your answer to two decimal places.

0.37

Correct Response

We have $\hat{p} - 1.96\sqrt{\hat{p}(1-\hat{p})/n} = .47 - 1.96\sqrt{(.47)(.53)/100} = .372$, which is the lower end of a 95% confidence interval for p.

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1 / 1 points

Coin flip:

3. • Report the upper end of this interval and round your answer to two decimal places.

0.57

Correct Response

We have $\hat{p} + 1.96\sqrt{\hat{p}(1-\hat{p})/n} = .47 + 1.96\sqrt{(.47)(.53)/100} = .568$, which is the upper end of a 95% confidence interval for p.

1 / 1 points

4.

The likelihood function for parameter θ with data $\mathbf{y}$ is based on which of the following?

- $P(\theta \mid \mathbf{y})$
- $P(\mathbf{y} \mid \theta)$

Correct Response

The likelihood is based on the sampling distribution of the data, given the parameter. Note that although the likelihood has the same functional form as $P(\mathbf{y} \mid \theta)$, it is considered a function of θ.

- $P(\theta)$
- $P(\mathbf{y})$
- None of the above.

1 / 1
points

5.

Recall from Lesson 4.4 that if $X_1, \ldots, X_n \overset{\text{iid}}{\sim} \text{Exponential}(\lambda)$ (iid means independent and identically distributed), then the MLE for λ is $1/\bar{x}$ where $\bar{x}$ is the sample mean. Suppose we observe the following data:
$X_1 = 2.0,\ X_2 = 2.5,\ X_3 = 4.1,\ X_4 = 1.8,\ X_5 = 4.0$.

Calculate the MLE for λ. Round your answer to two decimal places.

0.35

Correct Response

The sample mean is $\bar{x} = 2.88$.

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1 / 1
points

6.

It turns out that the sample mean $\bar{x}$ is involved in the MLE calculation for several models. In fact, if the data are independent and identically distributed from a Bernoulli(p), Poisson(λ), or Normal(μ, σ^2), then $\bar{x}$ is the MLE for p, λ, and μ respectively.

Suppose we observe $n = 4$ data points from a normal distribution with unknown mean μ. The data are $\mathbf{x} = \{-1.2, 0.5, 0.8, -0.3\}$.

What is the MLE for μ ? Round your answer to two decimal places.

-0.05

Correct Response

This is $(-1.2 + 0.5 + 0.8 - 0.3)/4$.