Lesson 11

Quiz, 5 questions

4/5 points (80%)

Congratulations! You passed!

Next Item

1 / 1
points

1.
Suppose we flip a coin five times to estimate θ, the probability of obtaining heads. We use a Bernoulli likelihood for the data and a non-informative (and improper) Beta(0,0) prior for θ. We observe the following sequence: (H, H, H, T, H).

Because we observed at least one H and at least one T, the posterior is proper. What is the posterior distribution for θ?

- Beta(4.5, 1.5)
- Beta(2,5)
- Beta(1,4)
- Beta(4,1)

Correct
We observed four "successes" and one "failure," and these counts are the parameters of the posterior beta distribution.

- Beta(1.5, 4.5)
- Beta(5,2)

1 / 1
points

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2.

Continuing the previous question, what is the posterior mean for θ? Round your answer to one decimal place.

0.8

Correct Response

This is the same as the MLE, $\bar{y}$.

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1 / 1 points

3.

Consider again the thermometer calibration problem from Lesson 10.

Assume a normal likelihood with unknown mean θ and known variance $\sigma^2 = 0.25$. Now use the non-informative (and improper) flat prior for θ across all real numbers. This is equivalent to a conjugate normal prior with variance equal to ∞.

- You collect the following $n = 5$ measurements: (94.6, 95.4, 96.2, 94.9, 95.9). What is the posterior distribution for θ?

- [x] $\mathrm{N}(95.4, 0.05)$

Correct

This is $\mathrm{N}(\bar{y}, \frac{\sigma^2}{n})$.

- [ ] $\mathrm{N}(96.0, 0.05^2)$
- [ ] $\mathrm{N}(95.4, 0.25)$
- [ ] $\mathrm{N}(96.0, 0.25^2)$

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1 / 1 points

4.

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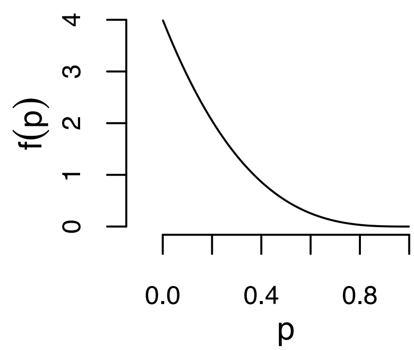
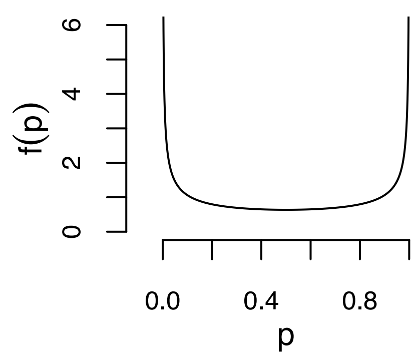
Which of the following graphs shows the Jeffreys prior for a Bernoulli/binomial success probability p?

Hint: The Jeffreys prior in this case is Beta(1/2, 1/2).

- [ ] 

- [x] 

Correct

Beta distributions with parameters between 0 and 1 have a distinct "U" shape.

- [ ]

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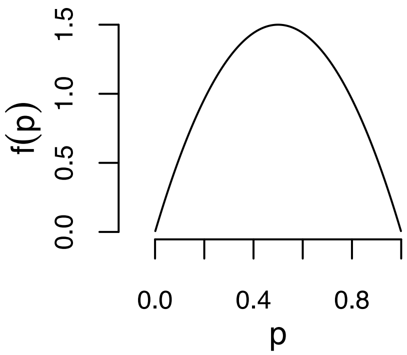

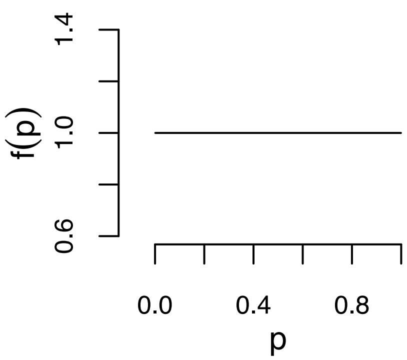

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0 / 1 points

5.

Scientist A studies the probability of a certain outcome of an experiment and calls it θ. To be non-informative, he assumes a Uniform(0,1) prior for θ.

Scientist B studies the same outcome of the same experiment using the same data, but wishes to model the odds $\phi = \frac{\theta}{1-\theta}$. Scientiest B places a uniform distribution on ϕ. If she reports her inferences in terms of the probability θ, will they be equivalent to the inferences made by Scientist A?

Yes, they both used uniform priors.

This should not be selected

The uniform prior on θ implies the following prior PDF for ϕ: $f(\phi) = \frac{1}{(1+\phi)^2} I_{\{\phi \geq 0\}}$, which clearly is not the uniform prior used by Scientist B.

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- Yes, they used the Jeffreys prior.
- No, they are using different parameterizations.
- No, they did not use the Jeffreys prior.