1 point

1.
For which of the following situations would a 0/1 loss function make the most sense?

- Your estimate of the market price of your house.
- Your prediction for the number of bikes sold this year by a local bike shop.
- Your prediction as to whether it will rain tomorrow.
- Your answer choice on a Coursera multiple choice quiz.

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1 point

2.
Fill in the blank: Under a **linear loss function**, the summary statistic that minimizes the posterior expected loss is the _________ of the posterior.

- Mode
- Median
- Mean

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1 point

3.

You are employed in the Human Resources department of a company and are asked to predict the number of employees that will quit their jobs in the coming year. Based on a Bayesian analysis of historical data, you determine the posterior predictive distribution of the number of quitters to follow a Poisson($\lambda = 10$) distribution. Given a **quadratic** loss function, what is the prediction that minimizes posterior expected loss?

- a. 9
- b. 10
- c. 11
- d. Either a or b

1
point

4.
Suppose that you are trying to decide whether a coin is biased towards heads ($p = 0.75$) or tails ($p = 0.25$). If you decide incorrectly, you incur a loss of 10. Flipping another coin incurs a cost of 1. If your current posterior probability of a head-biased coin is 0.6, should you make the decision now or flip another coin and then decide?

- Make the decision now, since the minimum posterior expected loss of making the decision now is 4, while the minimum posterior expected loss of making the decision after seeing another coin flip is between 5 and 6.
- Make the decision now, since the minimum posterior expected loss of making the decision now is 4, while the minimum posterior expected loss of making the decision after seeing another coin flip is between 4 and 5.
- Flip another coin, since the minimum posterior expected loss of making the decision now is 4, while the minimum posterior expected loss of making the decision after seeing another coin flip is between 3 and 4.
- Flip another coin, since the minimum posterior expected loss of making the decision now is 4, while the minimum posterior expected loss of making the decision after seeing another coin

flip is between 2 and 3.

1
point

5.
You are testing a hypothesis H_1 against an alternative hypothesis H_2 using Bayes Factors. You calculate $BF[H_1 : H_2]$ to be 0.427. According to guidelines first given by Jeffreys (and presented in the lecture), what conclusion can be drawn from the data?

- The data provides strong evidence against H_1.
- The data provides strong evidence against H_2.
- The data provides little to no evidence against H_1.
- The data provides significant evidence against H_1.

1
point

6.
Suppose that you are trying to estimate the true proportion p of male births in the United States. Starting with a uniform prior (Beta(1,1)) on p, you randomly sample 10,000 birth certificates, observing 5029 males and 4971 females. What is the posterior probability that p is less than or equal to 0.5? (Hint: use function(s) in R to answer this question)

- 0.27
- 0.28
- 0.29
- 0.30

1
point

7.

True or False: A Bayesian hypothesis test for a mean $\mu = 0$ using a concentrated prior on μ will yield nearly identical results to a hypothesis test with a high-variance prior μ?

- True
- False

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1 point

8.

Suppose you are trying to infer the difference in the proportion of yellow M&Ms between two bags of M&Ms. Each bag is estimated to contain roughly 30 M&Ms. To make inferences about the proportion, you draw 10 M&Ms from each bag **without** replacement and record the number of yellow M&Ms in each bag.

Is there a problem with the experimental design? If so, what is it?

- There is no problem with the experimental design.
- Yes, the probability of drawing a yellow M&M is not independent within groups.
- Yes, the probability of drawing a yellow M&M is not independent between groups.

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1 point

9.

Suppose that when testing $H_0 : p = 0.5$ versus $H_1 : p \neq 0.5$ using Bayes Factors, we get the posterior probability $P(H_0 \mid \text{data}) = 0.25$. Conditional on H_1, the posterior mean of p is 0.6. Under **quadratic** loss, what is the point estimate for p that minimizes expected posterior loss?

- 0.5

0.55

0.575

0.6

1 point

10.
True or False: The use of the reference prior $Beta(1/2, 1/2)$ has little bearing on the posterior distribution of a proportion p, provided that the sample size is sufficiently large.

True

False

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