Congratulations! You passed!

Next Item

1 / 1 point

1.
True or False: The mean and standard deviation of the posterior distribution of a slope or intercept parameter in Bayesian linear regression is equal to the least squares estimate and corresponding standard error if the reference prior is used and normally distributed errors are assumed.

True

Correct
When the reference prior $p(\beta, \sigma^2) \propto 1/\sigma^2$ is used, the marginal posterior distribution of β follows a t-distribution, with mean and standard deviation equal to the OLS estimate and standard error respectively.

This question refers to the following learning objective(s):

- Understand the basics of Bayesian linear regression and how it relates to Frequentist regression.

False

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1 / 1 point

2.
A linear model was estimated using Bayesian methods to predict the height of a male based on his age. All males used in the data are between the ages of 3 to 9 years old. Is it appropriate to use this model to predict the height of a 21 year old man?

Yes, as long as proper priors are given to the parameters to ensure that the posterior is proper.

- No, since heights may be skewed right, which violates the assumption of normality.
- Yes, an advantage of Bayesian statistics is its ability to generate predictions and express uncertainty in terms of probabilities.
- No, since extrapolating outside the range of age observed in the data set may result in a nonsensical prediction.

Correct
This question refers to the following learning objective(s):

- Identify the assumptions of linear regression and assess when a model may need to be improved.

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1 / 1 point

3.
Suppose we want to set a level k such that if we observe a data point more than k standard deviations away from the mean, we deem it an outlier. If the number of observations is 1000, what is the probability that we observe an outlier at least 4 standard deviations away from its prediction value?

- 0.03
- 0.06

Correct
This question refers to the following learning objective(s):

- Check the assumptions of a linear model
- Identify outliers and high leverage points in a linear model.

- 0.12
- 0.24

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1 / 1 point

4.
Suppose a researcher is using Bayesian multiple regression to quantify the effect of vitamin C on cancer patient mortality. The central 95% posterior credible interval of the coefficient of vitamin C dosage is (-0.19, -0.07). Assuming the model assumptions are valid, what can we say about the effect of vitamin C on cancer patient mortality?

- We reject the null hypothesis of no difference, since the 95% credible interval does not include zero.
- The posterior probability that the coefficient of vitamin C is greater than zero is low, so there is a high posterior probability of a negative association between vitamin C and cancer patient mortality.

Correct
This question refers to the following learning objective(s):

- Interpret Bayesian credible and predictive intervals in the context of multiple linear regression.

- There is not enough information to quantify the effect of vitamin C on cancer patient mortality.

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1 / 1 point

5.
Which of the following goes into the calculation of the Bayesian Information Criterion (BIC)?

- The maximum value of the log-likelihood under the current model, a constant penalty, and the number of parameters in the model
- The maximum value of the log-likelihood under the current model
- The maximum value of the log-likelihood under the current model, the sample size, and the number of parameters in the model

Correct
This question refers to the following learning objective(s):

- Use principled statistical methods to select a single parsimonious model.

- The maximum value of the log-likelihood under the current model and the number of parameters in the model

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✔ 1 / 1 point

6.
In a linear model with an intercept term (that is always included) and 3 potential predictors, how many possible models are there?

- 3
- 4
- 8

Correct
This question refers to the following learning objective(s):

- Implement Bayesian model averaging for both prediction and variable selection.

- 16

✔ 1 / 1 point

7.
Can Bayesian model averaging be done with a large amount of predictors?

- Yes, but Monte Carlo sampling techniques will need to be done to approximate the posterior distribution

Correct
This question refers to the following learning objective(s):

- Understand the importance and use of MCMC within Bayesian model averaging.

- No, since it will take forever to average over 2^k possible models when k is large.

Yes, it is possible to find the posterior model probabilities in closed form by using the conjugate Zellner g-prior.

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1 / 1 point

8.

Which of the following is **not** a useful method of checking a linear model after it is fit?

Examining the influence of potential outliers on the parameters of the model.

Plotting the residuals to check for non-normally distributed residuals.

Ensuring that R^2 is as close to 1 as possible.

Correct

This question refers to the following learning objective(s):

- Deduce how wrong model assumptions affect model results.

Comparing the distribution of fitted values to the distribution of observed data.

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1 / 1 point

9.

Which of the following is an advantage of using the Zellner-Siow-Cauchy prior in Bayesian model averaging?

It helps shrink the coefficients towards 0, which is important if the variables are highly correlated

It prevents BMA from disproportionately favoring the null model as a result of the Bartlett-Lindley paradox

It allows for uncertainty in the prior variance parameter g

Both b and c

Correct

This question refers to the following learning objective(s):

- Understand the purpose of prior distributions within Bayesian model averaging.

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0 / 1 point

10.
When selecting a single model from an ensemble of models in the case of Bayesian model averaging, which of the following selection procedures corresponds to choosing the "median probability model"?

- Including only the coefficients with posterior model inclusion probability above 0.5.
- Selecting the model that generates predictions most similar to those obtained from averaging over the model space.
- Selecting the model with the highest posterior model probability.

This should not be selected
