Model Selection and Diagnostics Quiz

12/12 points earned (100%)

Quiz passed!

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1 / 1 points

1.
Suppose you are regressing $\log(price)$ on $\log(area)$, $\log(Lot.Area)$, *Bedroom.AbvGr*, *Overall.Qual*, and *Land.Slope*. Which of the following variables are included with stepwise variable selection using AIC but not BIC?

- log(*area*)
- log(*Lot.Area*)
- *Bedroom.AbvGr*
- *Overall.Qual*
- *Land.Slope*

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

Use principled statistical methods to select a single parsimonious model.

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1 / 1

1 / 1 points

2.

When regressing $\log(price)$ on *Bedroom.AbvGr*, the coefficient for *Bedroom.AbvGr* is strongly positive. However, once $\log(area)$ is added to the model, the coefficient for *Bedroom.AbvGr* becomes strongly negative. Which of the following best explains this phenomenon?

- The original model was misspecified, biasing our coefficient estimate for *Bedroom.AbvGr*
- Bedrooms take up proportionally less space in larger houses, which increases property valuation.
- Larger houses on average have more bedrooms and sell for higher prices. However, holding constant the size of a house, the number of bedrooms decreases property valuation.

Correct

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

Interpret the estimate for a slope (say b_1) as "All else held constant, for each unit increase in x_1, we would expect y to be higher/lower on average by b_1."

- Since the number of bedrooms is a statistically insignificant predictor of housing price, it is unsurprising that the coefficient changes depending on which variables are included.

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1 / 1 points

3.

Run a simple linear model for $\log(price)$, with $\log(area)$ as the independent variable. Which of the following neighborhoods has the highest average residuals?

- OldTown
- StoneBr
- GrnHill

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.
- Examine the residuals of a linear model.

IDOTRR

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1 / 1 points

4.

We are interested in determining how well the model fits the data for each neighborhood. The model from Question 3 does the worst at predicting prices in which of the following neighborhoods?

GrnHill

Correct

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

Examine the residuals of a linear model.

BlueSte

StoneBr

MeadowV

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1 / 1 points

5.

Suppose you want to model $\log(price)$ using only the variables in the dataset that pertain to quality: *Overall.Qual*, *Basement.Qual*, and *Garage.Qual*. How many observations must be discarded in order to estimate this model?

0

46

- [x] 64

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.

- [ ] 924

✔ 1 / 1 points

6.
NA values for *Basement.Qual* and *Garage.Qual* correspond to houses that do not have a basement or a garage respectively. Which of the following is the best way to deal with these *NA* values when fitting the linear model with these variables?

- [ ] Drop all observations with *NA* values for *Basement.Qual* or *Garage.Qual* since the model cannot be estimated otherwise.

- [ ] Recode all *NA* values as the category TA since we must assume these basements or garages are typical in the absence of all other information.

- [x] Recode all *NA* values as a separate category, since houses without basements or garages are fundamentally different than houses with both basements and garages.

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

Check the assumptions of a linear model.

✔ 1 / 1 points

7.

Run a simple linear model with $\log(price)$ regressed on *Overall.Cond* and *Overall.Qual*. Which of the following subclasses of dwellings (*MS.SubClass*) has the highest median predicted prices?

- [x] 075: 2-1/2 story houses

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

Predict the value of the response variable for a given value of the explanatory variable, $x^\star$, by plugging in $x^\star$ in the linear model

- [ ] 060: 2 story, 1946 and Newer
- [ ] 120: 1 story planned unit development
- [ ] 090: Duplexes

✔ 1 / 1 points

8.
Using the model from Question 7, which observation has the highest leverage or potential influence on the regression model? Hint: use hatvalues, hat or *lm.influence*.

- [ ] 125
- [x] 268

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

Identify outliers and high leverage points in a linear model.

- [ ] 640
- [ ] 832

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1 / 1 points

9.

Which of the following corresponds to a correct interpretation of the coefficient k of *Bedroom.AbvGr*, where $\log(price)$ is the dependent variable?

- Holding constant all other variables in the dataset, on average, an additional bedroom will increase housing price by k percent.
- Holding constant all other variables in the model, on average, an additional bedroom will increase housing price by k percent.

Correct

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

Interpret the estimate for a slope (say b_1) as "All else held constant, for each unit increase in x_1, we would expect y to be higher/lower on average by b_1."

- Holding constant all other variables in the dataset, on average, an additional bedroom will increase housing price by k dollars.
- Holding constant all other variables in the model, on average, an additional bedroom will increase housing price by k dollars.

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1 / 1 points

10.

Which of the following sale condition categories shows significant differences from the normal selling condition?

- Family
- Abnorm
- Partial
- Abnorm and Partial

Correct

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

- Be cautious about using a categorical explanatory variable when one of the levels has very few observations, as these may act as influential points.
- List the conditions for multiple linear regression.

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1 / 1 points

11.

Subset ames_train to only include houses sold under normal sale conditions. What percent of the original observations remain?

- 81.2%
- 83.4%

Correct

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

Use R commands to effectively manipulate data.

- 87.7%
- 91.8%

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1 / 1 points

12.

Now re-run the simple model from question 3 on the subsetted data. True or False: Modeling only the normal sales results in a better model fit than modeling all sales (in terms of R^2).

- True, restricting the model to only include observations with normal sale conditions increases the R^2 from 0.547 to 0.575.

Correct

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

- Be cautious about using a categorical explanatory variable when one of the levels has very few observations, as these may act as influential points.
- Define R^2 as the percentage of the variability in the response variable explained by the the explanatory variable.

- True, restricting the model to only include observations with normal sale conditions increases the R^2 from 0.575 to 0.603.
- False, restricting the model to only include observations with normal sale conditions decreases the R^2 from 0.575 to 0.547.
- False, restricting the model to only include observations with normal sale conditions decreases the R^2 from 0.603 to 0.575.