Question 1
What is the optimal value of alpha for ridge and lasso regression? What will be the changes in the model if you choose double the value of alpha for both ridge and lasso? What will be the most important predictor variables after the change is implemented?

Ans:

1. The optimal lambda value in case of Ridge and Lasso is as below:
    - Ridge - 10
    - Lasso - 0.0001
2. If we double the alpha for lasso, the mean squared error gets slightly decreased and the most important predictor variable remains same in this case.
3. And if we double the alpha for ridge, the mean squared error gets slightly increased but the most important predictor variable remains same in this case also.

Question 2
You have determined the optimal value of lambda for ridge and lasso regression during the assignment. Now, which one will you choose to apply and why?

Ans:

1. The optimal lambda value in case of Ridge and Lasso is as below:
    - Ridge - 10
    - Lasso - 0.0001

2. The Mean Squared error in case of Ridge and Lasso are:
    - Ridge - 0.013295
    - Lasso - 0.013313

The Mean Squared Error of Ridge is slightly lower than that of Lasso

Although Ridge regression gives slightly better result than LASSO , but if we use ridge regression, we cannot reduce the number of variables. So, Lasso Regression would be better.

Question 3
After building the model, you realised that the five most important predictor variables in the lasso model are not available in the incoming data. You will now have to create another model excluding the five most important predictor variables. Which are the five most important predictor variables now?

Ans: According to my model, the other five predictor variables would be OverallCond, TotalBsmtSF, GarageCars, Foundation_PConc, BsmtFinSF1.

Question 4

How can you make sure that a model is robust and generalisable? What are the implications of the same for the accuracy of the model and why?

Ans: According to me, we should pick the model that makes fewer on the test data because:

1. Simple models are usually more generic and also they are widely used.
2. Simple models does not require much training samples
3. Simple models are more robust than the complex one.
4. Also, complex models leads to overfitting most of the times.

So, to keep the model robust and generalised, we should try keeping our model simple and useful.

Also, the implications of the same for the accuracy of the model would be:

1. Complex model will always have higher probability to change with the changes in dataset and therefore, its unstable and sensitive to handle, but simple models does not change frequently with the changes in its datasets.

Bias implies that how accurate is the model likely to be on test dataset. A complex model can do an better job if there is enough training data. Models that are too inexperienced, has a very large bias as its expected error across all test inputs are very high. Variance refers to the degree of changes in the model itself with respect to changes in the training data. So, the accuracy of the model can be maintained by keeping the balance between Bias and Variance as it minimizes the total error.

Diagram: Bias-Variance Trade-off