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?

Answer: The optimal value of alpha for ridge is 10 and the optimal value for lasso regression is 0.001.
With these, the r2 score is 0.91

We would not see a significant change if we double the value of alpha for both ridge and lasso.

The predictor variables will remain the same after the change is implemented of doubling the value of alpha for both ridge and lasso.

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?

Answer: The optimal value of alpha for ridge is 10 and the optimal value for lasso regression is 0.001.

We can go with lasso as lasso makes certain feature coefficients to be zero. This helps in feature selection as well as regularisation.

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?

Answer:
The next top 5 features from Ridge are:

6. GarageFinish_No Garage : 0.075
7. GarageType_Others : 0.058
8. GarageType_No Garage : 0.057
9. GarageType_Detchd : 0.056
10. GarageType_BuiltIn : 0.054

The next top 5 features for Lasso are:

6. GarageFinish_No Garage : 0.081
7. GarageType_Others : 0.059
8. GarageType_No Garage : 0.056
9. GarageType_Detchd : 0.052
10. GarageType_BuiltIn : 0.047

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?

Answer:
1. Simpler mode (with less features) are generally more accepted.
2. Simpler model are more robust
3. Simpler models have low variance and high bias better than complex models

To make a model robust and generalisable have a simple model but not so simple that it is of no use.

Regularization can be used to make the model simpler. Regularization helps to strike the delicate balance between keeping the model simple and not making it too naive to be of any use.
For regression, regularization involves adding a regularization term to the cost that adds up the absolute values or the squares of the parameters of the model.

Also, Making a model simple leads to Bias-Variance Trade-off:

- A complex model will need to change for every little change in the dataset and hence is very unstable and extremely sensitive to any changes in the training data.
- A simpler model that abstracts out some pattern followed by the data points given is unlikely to change wildly even if more points are added or removed.
-

Bias quantifies how accurate is the model likely to be on test data. A complex model can do an accurate job prediction provided there is enough training data. Models that are too naïve, for e.g., one that gives same answer to all test inputs and makes no discrimination whatsoever 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.

Thus accuracy of the model can be maintained by keeping the balance between Bias and Variance as it minimizes the total error .