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 values of alpha are –

- For Ridge regression – 30
- For Lasso regression – 0.003

After doubling the alpha values, we get the following –

- Alpha for Ridge – 60
- Alpha for Lasso – 0.006

Top 3 predictors from the Ridge model and Lasso model after doubling alpha are as follows –

	Ridge_dbl
1stFlrSF	0.088818
2ndFlrSF	0.062987
GarageArea	0.038710

	Lasso_dbl
1stFlrSF	0.109324
2ndFlrSF	0.081241
BsmtQual	0.041852

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 2: We see that the R squared value on test data is higher in case of Ridge regression, hence we will go ahead with the Ridge regression model for this dataset. The mean squared error also is slightly lower in case of the Ridge model.

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 3: After removing the top 5 predictors, the next set of top 5 predictors as per the new Lasso regression model are as below –

'1stFlrSF', '2ndFlrSF', 'GarageArea', 'BsmtQual', 'KitchenQual'

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 : In order to have a robust and generalisable model, we need to ensure bias-variance trade-off. This can be achieved by using Regularisation techniques such as Ridge and Lasso.

When the bias of a model is too low, it is overfitting on the training data and the variance is too high, resulting in a poor performance on unseen data. The Ridge and Lasso regularization techniques, in their own way, increase the bias of the model and bring the variance significantly down by adding a penalty term to the linear regression (OLS) equation.