Q1. 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. Optimal value of alpha for both ridge and lasso regression is 20. If we double the value of alpha, overfitting/variance is getting reduced, but bias is also getting increased.

Ridge Regression	**Alpha = 20**	**Alpha = 40**
R Square – Train	0.88	0.87
R Square – Test	0.87	0.86
Lasso Regression		
R Square – Train	0.94	0.91
R Square – Test	0.85	0.85

The most important predictor variables after implementing the change are Northridge Physical Location (Neighborhood_NoRidge), Good Basement Quality (BsmtQual_Gd), Northridge Heights Physical Location (Neighborhood_NridgHt) etc.

	Ridge
Neighborhood_NoRidge	15857.281751
Neighborhood_NridgHt	14623.317124
OverallQual	12527.881143
BsmtExposure_Gd	12025.544970
Condition1_Norm	10020.031726
...	...
BsmtExposure_No	-9038.985274
KitchenQual_TA	-9970.434711
Neighborhood_Edwards	-11306.681545
KitchenQual_Gd	-12660.974528
BsmtQual_Gd	-15898.350951

Q2. 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. Ridge regression with lambda value of 20 is more suited as it takes overfitting into consideration. Lasso regression results are almost same as of linear regression. Thus finally, we take ridge regression model for predicting sales prices.

Q3. 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. If we drop the five most important predictors (RoofMatl_WdShngl, RoofMatl_CompShg, RoofMatl_Membran, RoofMatl_WdShake, Condition2_PosN) in lasso model, then the next five important predictors are Condition2_PosA, Condition2_Norm, Condition2_Feedr, Neighborhood_NoRidge, Condition2_RRNn.

Q4. 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. A model is robust if the R square and RMSE values are high for the model and a model is generalizable if there is less variance in the model. That is there is not much difference in R square values in training and test dataset. If we try to decrease the overfitting, that is try to make model simple and generalizable, then we will loose on the accuracy of the model. This is due to bias-variance tradeoff. As variance decreases, bias increases and vice versa.