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 optional value for Ridge and Lasso is 500.

If we double the alpha then below are the scores.

	Metric	Ridge Regression	Lasso Regression
0	R2 Score (Train)	8.962060e-01	9.156736e-01
1	R2 Score (Test)	8.487200e-01	8.376933e-01
2	RSS (Train)	6.622785e+11	5.380611e+11
3	RSS (Test)	4.264149e+11	4.574960e+11
4	MSE (Train)	2.546874e+04	2.295635e+04
5	MSE (Test)	3.120176e+04	3.231890e+04

Five important predictor After the changes are

Ridge	Lasso
GrLivArea	**GrLivArea**
OverallQual_9	**OverallQual_9**
1stFlrSF	**OverallQual_10**
GarageCars_3	**OverallQual_10**
OverallQual_10	**OverallQual_3**

Question2:
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:
Even though accuracy wise there isn't a drastic difference between two techniques, I will choose Lasso over Rdge considering it does feature elimination and model is not complex i.e it eliminates 262 features making the model less complex and more interpretable.

Question3:
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:
After removing the variables again there is not much change in the accuracy metrics and no of features eliminated are now 262 and top 5 important features are now

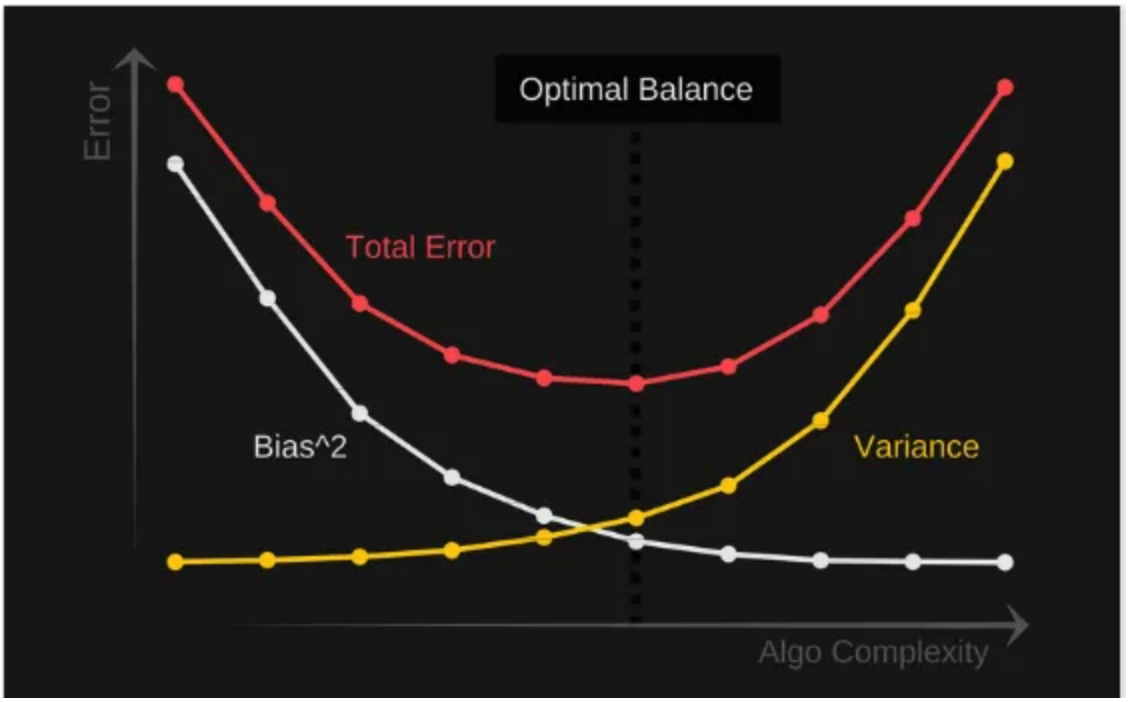
1. MSSubClass
2. 2ndFlrSF
3. LowQualFinSF
4. GarageCars_4
5. HalfBath_1

Question4:
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. Model performance should not be affected by any changes to the data
2. Generic model should adapt and do well on the unseen data and accuracy should be good
3. As per ocam razor a good model should not be complex and it should interprettable

But point 2 & 3 has a trade off let say if the model is too simple it leads to underfitting that is it doesnt learn important patterns leading to low accuracy(**Bias**) and on the other hand if the model is too complex it overfits training data and does not generalise well on the unseen data this also leads to any changes to data will impact the performance of the model(**Variance**) The above variation is called bias variance trade off and we should find optimal point that balances both as per the below diagram


Optimal Balance
Error
Total Error
Bias^2
Variance
Algo Complexity