**Problem – 2**

**NOTE:**

For testing purposes, basically to run my .py file , I have the following within my function file to call my main().

A picture containing object

Description automatically generated

It is not commented out because I was not sure whether it would be required for grading or not.

Request you to comment it out before running my program , if it is not required and may possibly throw off the autograder.

Thank you.

**Question 1:** Complete the function normalize to normalize the feature matrix X. The nine columns of this matrix, X = [x1 x2 · · · x9], must each be normalized to have a mean of 0 and a standard deviation of 1.

**Answer – 1:**

**A screenshot of a cell phone

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**Question-2:** Define the range of λ to test in main as 0.1, 0.2, ..., 1.0, 1.5, ..., 10.0, 11.0, ..., 100. This type of logarithmic scale, moving from a smaller to a larger increment, is common for regularization.

**Answer-2:**

**A screenshot of a cell phone

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**Question -3:** Complete the function train model to fit a ridge regression model with regularization parameter λ = l on a training dataset Xtrain, ytrain. You may use the linear model.Ridge class in sklearn to do this. Note that the partition of the training and testing set has already been done for you.

**Answer-3:**

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**Question-4:** Complete the function error to calculate the mean squared error of the model on a testing dataset Xtest, ytest.

**Answer -4:**

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**Question – 5:** Complete the code in main for plotting the mean squared error as a function of λ, and for finding the model and mse corresponding to the best lmbda. Be sure to include a title and axes labels with your plot.

**Answer-5:**

**Code Snippet for Plotting:**

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**Plot obtained:**

**A screenshot of a social media post

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**Answer Obtained after completing all the function is:**

**A picture containing indoor

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**Question – 6:** Using the coefficients (and intercept) β = (c9, c8, · · · c0) from the returned model best, write out the equation ˆy(x) = c9x1 + c8x2 + · · · + c1x9 + c0 of your fitted model for a sample x. What is the predicted price ˆy for a 0.25 carat, 3 cut, 3 color, 5 clarity, 60 depth, 55 table, 4 x, 3 y, 2 z diamond?

**Answer – 6:**

**A screenshot of a cell phone

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**Equation obtained :**

**Price(y) =** (-458.64762287) \* carat + (74.36809593) \* depth + (501.75988087) \* table + (-68.47734902) \* x + (222.31481412)\* y + (-1333.9900337)\* z + (-208.10437575)\* clarity + (201.39843689)\* cut + (5109.53168875)\* color

The predicted price ˆy for a 0.25 carat, 3 cut, 3 color, 5 clarity, 60 depth, 55 table, 4 x, 3 y, 2 z diamond is shown in the image below. This output was obtained using the code snippet above.

A close up of a screen

Description automatically generated

Therefore, we can say that the predicted price ˆy for a 0.25 carat, 3 cut, 3 color, 5 clarity, 60 depth, 55 table, 4 x, 3 y, 2 z diamond is 3435.4267170717444