# Step 1: Understanding the Model

1. According to the linear model provided, if a diamond is 1 carat heavier than another with the same cut and clarity, how much more should we expect to pay? Why?

    a. A carat heavier would result in an additional $8,413 in price. The formula created by the regression determined that the coefficient for a carat is 8,413 so for every increase in the weight of carat the price will increase by the amount of the coefficient.

2. If you were interested in a 1.5 carat diamond with a **Very Good** cut (represented by a 3 in the model) and a **VS2** clarity rating (represented by a 5 in the model), how much would the model predict you should pay for it?
    a. The formula is Price = -5,269 + 8,413 x Carat + 158.1 x Cut + 454 x Clarity
        i. so now we will plug in the values for the different variables.
        ii. Price = -5,269 + 8,413 x 1.5 + 158.1 x 3 + 454 x 5
        iii. Price = 10,094.8

Step 2: Visualize the Data

1. Plot 1 - Plot the data for the diamonds in the database, with carat on the x-axis and price on the y-axis.
2. Plot 2 - Plot the data for the diamonds for which you are predicting prices with carat on the x-axis and predicted price on the y-axis.
    o **Note**: You can also plot both sets of data on the same chart in different colors.
3. What strikes you about this comparison? After seeing this plot, do you feel confident in the model's ability to predict prices?

Carat vs Price
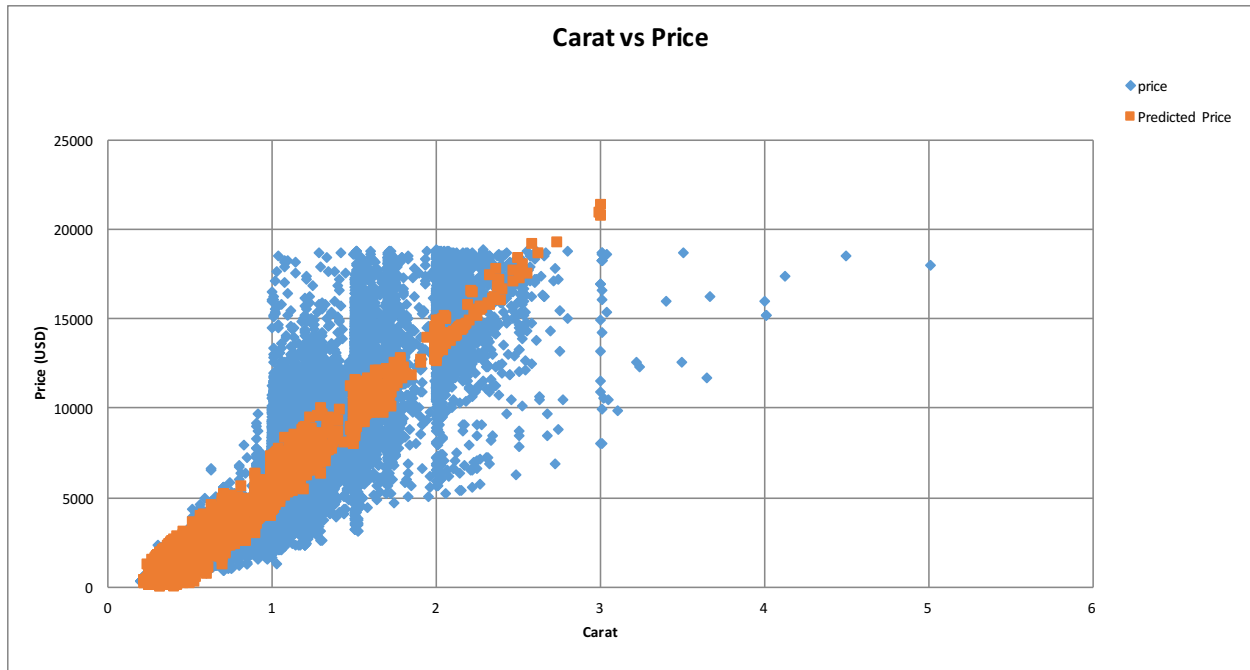
The predicted prices are more compact than the actual data is. This is because we are only accounting on carats. There are many more factors than carats that effect the price. We had cuts and clarity factored into our formula but those will not account for all the variation.

After looking at this plot the model appears on average to predict the prices ok, but it can be very off for certain diamonds. There appears to be an outlier diamond with only 1 carat in weight but sold for almost $20,000.00. While the formula may not be accurate for an individual diamond, it should do a decent job at predicting the price we should pay for 3,000 diamonds at once since it on average looks representative.

Step 3: Make a Recommendation

1. What price do you recommend the jewelry company to bid? Please explain how you arrived at that number. HINT: The number should be 7 digits.
   a. I recommend a bid of $8,213,465.93. I arrived at this number by using a formula from the regression model provided that was based on large database of diamond prices and applied it to the diamonds that were up for bid. Since company generally purchases diamonds from distributors at 70% of the final retail price, I multiply the predicted amount 11,733,522.76 by .70 to get the final predicted bid of $8,213,465.93