REAL ESTATE
Renovation Plan

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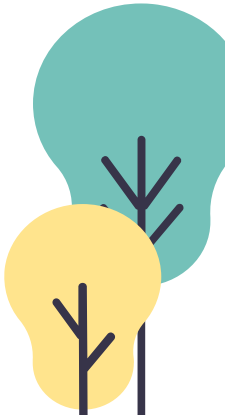


01

Business Problem

Overview of problem at hand

Business Problem

Who you are: Company that owns a number of real-estate home properties in Seattle
Who we are: Trusty neighborhood data scientists

Business Problem: With over 50% of US adults receiving COVID vaccinations[1], you're feeling more comfortable having people viewing and working on your property. You've hired us to provide renovation recommendations on how to increase the prices of your properties before putting them out on the market.

[1]https://www.npr.org/2021/04/18/988574518/more-than-half-of-u-s-adults-have-gotten-at-least-one-covid-19-vaccine-dose

02 Data Overview

Underlying data

Data Overview

Raw Data

~22,000 data points

Geographical Focus

Houses located in **Seattle**

Removed Outliers

Narrowed to houses with:
-5 bedrooms or less
-Footage of 3,000 ft^2 or less
-1 or 2 floors

Removed Outliers

Narrowed to houses with a price between $104,000 - $762,000

Final Dataset

~4,600 data points

03 Findings

Data Insights

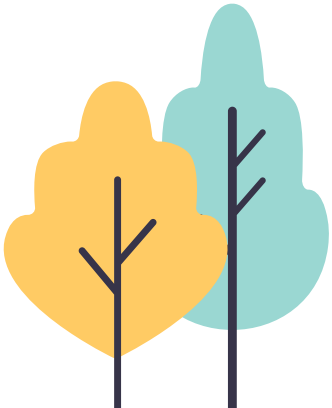
Linear Regression - Model

OLS Regression Results

Dep. Variable:	price_adjusted_M	**R-squared (uncentered):**	0.947
Model:	OLS	**Adj. R-squared (uncentered):**	0.947
Method:	Least Squares	**F-statistic:**	9235.
Date:	Wed, 21 Apr 2021	**Prob (F-statistic):**	0.00
Time:	10:42:37	**Log-Likelihood:**	4034.7
No. Observations:	4655	**AIC:**	-8051.
Df Residuals:	4646	**BIC:**	-7993.
Df Model:	9		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Grade 6	0.0397	0.019	2.092	0.037	0.002	0.077
Grade 7	0.1072	0.019	5.713	0.000	0.070	0.144
Grade 8	0.1795	0.019	9.472	0.000	0.142	0.217
Grade 9	0.2351	0.021	11.195	0.000	0.194	0.276
Grade 10	0.2822	0.037	7.581	0.000	0.209	0.355
Condition 2	0.2928	0.024	11.992	0.000	0.245	0.341
Condition 3	0.2986	0.019	15.963	0.000	0.262	0.335
Condition 4	0.3338	0.019	17.674	0.000	0.297	0.371
Condition 5	0.3546	0.019	18.437	0.000	0.317	0.392

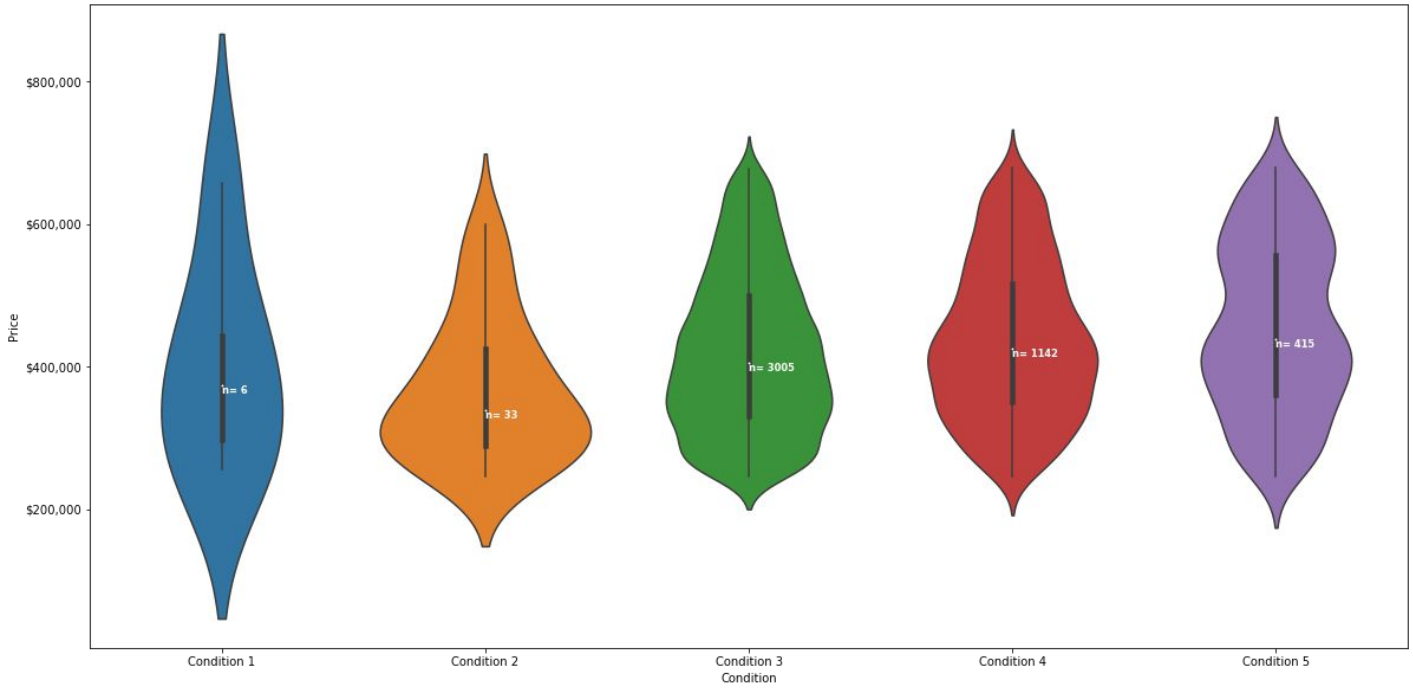
Omnibus:	121.161	**Durbin-Watson:**	1.970
Prob(Omnibus):	0.000	**Jarque-Bera (JB):**	128.805
Skew:	0.399	**Prob(JB):**	1.07e-28
Kurtosis:	2.838	**Cond. No.**	39.1



R-squared value of .947 means that **94.7%** of the variability in price can be explained by Grade and Condition.

Condition

Condition - Price Visualization



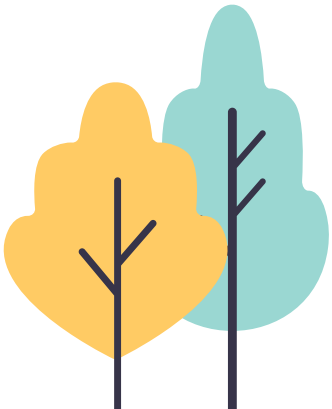
Is there a statistically significant price difference between Conditions?

Condition - Statistical Tests

Using a 2-sample t-test with a 95% confidence level, we set up our null and alternative hypothesis for testing.

Null: There is **no** difference in price between the two Conditions
Alternative: There is a difference in price between the two Conditions

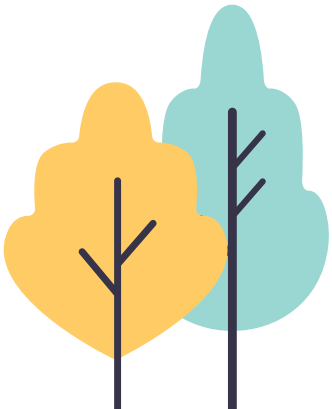
Is there a statistical price difference between Conditions?	**2-Sample T-Test Result**
Condition 2 to Condition 3	Reject null
Condition 3 to Condition 4	Reject null
Condition 4 to Condition 5	Reject null



Condition - Price Confidence Intervals

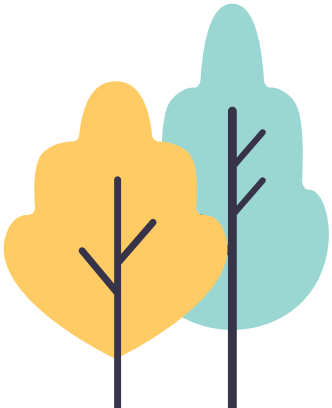
Armed with the knowledge of which Conditions prices were statistically significantly different from one another, we built 95% confidence intervals to measure the true mean of houses with these Conditions , in order to provide a value associated with making renovations to move a certain property into a higher Condition.

	Price Range (95% CI)	
Condition	**Lower Bound**	**Upper Bound**
Condition 2	$360,000	$373,000
Condition 3	$413,000	$427,000
Condition 4	$430,000	$444,000
Condition 5	$446,000	$461,000



Condition - Impact

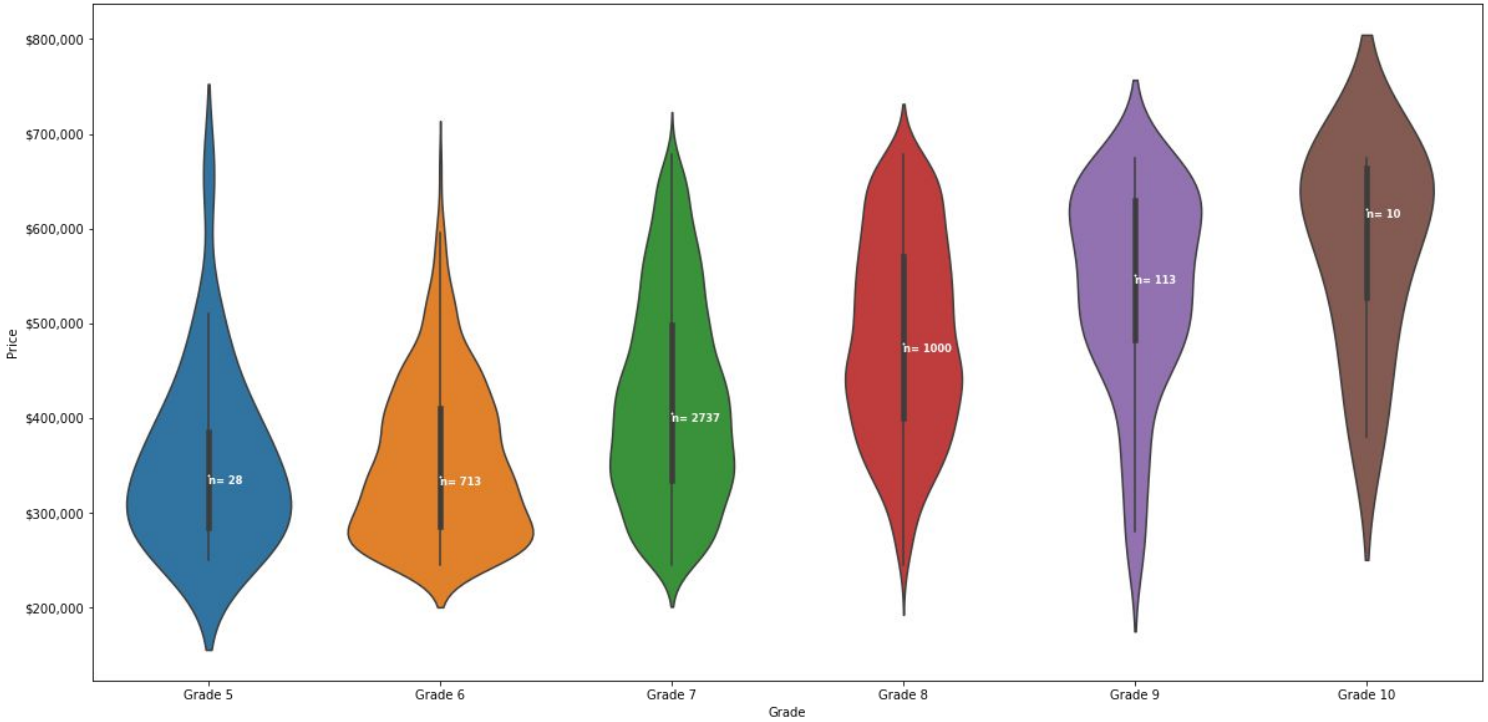
		Price Increase Range	
Is there a statistical price difference between Grades?	**2-Sample T-Test Result**	**Lower Bound**	**Upper Bound**
Condition 2 to Condition 3	Reject null	$40,000	$67,000
Condition 3 to Condition 4	Reject null	$3,000	$31,000
Condition 4 to Condition 5	Reject null	$2,000	$31,000



If the cost of making renovations, in order to move up a Condition level, is lower than the above price range, we would recommend moving forward with the renovations.

Grade

Grade - Price Visualization



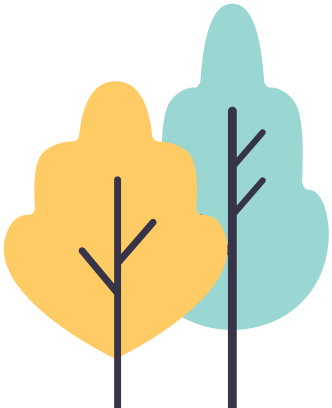
Is there a statistically significant price difference between Grades?

Grade - Statistical Tests

Using a 2-sample t-test with a 95% confidence level, we set up our null and alternative hypothesis for testing.

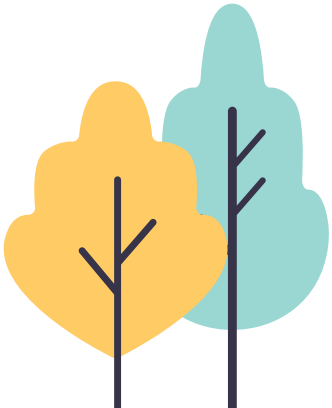
Null: There is **no** difference in price between the two Grades
Alternative: There is a difference in price between the two Grades

Is there a statistical price difference between Grades?	2-Sample T-Test Result
Grade 6 to Grade 7	Reject null
Grade 7 to Grade 8	Reject null
Grade 8 to Grade 9	Reject null



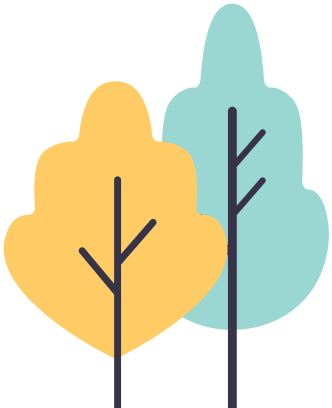
Grade - Price Confidence Intervals

	Price Range (95% CI)	
Grade	**Lower Bound**	**Upper Bound**
Grade 6	$349,000	$360,000
Grade 7	$413,000	$426,000
Grade 8	$531,000	$544,000
Grade 9	$574,000	$587,000



Grade - Impact

		Price Increase Range	
Is there a statistical price difference between Grades?	**2-Sample T-Test Result**	**Lower Bound**	**Upper Bound**
Grade 6 to Grade 7	Reject null	$53,000	$77,000
Grade 7 to Grade 8	Reject null	$105,000	$131,000
Grade 8 to Grade 9	Reject null	$30,000	$56,000



If the cost of making renovations, in order to move up a Grade level, is lower than the above price range, we would recommend moving forward with the renovations.

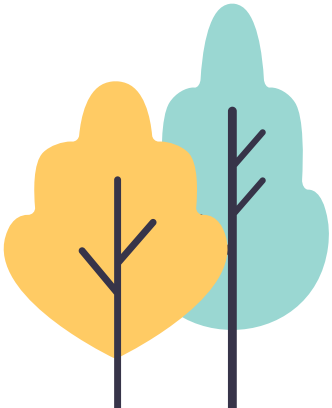
Limitations

Limitations

Due to the subsetting of our data, our estimates are only useful at predicting houses that are located in Seattle, and have similar properties as:

- 5 bedrooms or less
- 3000 ft^2 or less
- Either 1 or 2 floors
- Price between $104,000 - $762,000

To better refine our model, we would like to request details about the property you own.



04 Questions Comments?

Appendix

BUILDING CONDITION Relative to age and grade. Coded 1-5.

1 = Poor- Worn out. Repair and overhaul needed on painted surfaces, roofing, plumbing, heating and numerous functional inadequacies. Excessive deferred maintenance and abuse, limited value-in-use, approaching abandonment or major reconstruction; reuse or change in occupancy is imminent. Effective age is near the end of the scale regardless of the actual chronological age.

2 = Fair- Badly worn. Much repair needed. Many items need refinishing or overhauling, deferred maintenance obvious, inadequate building utility and systems all shortening the life expectancy and increasing the effective age.

3 = Average- Some evidence of deferred maintenance and normal obsolescence with age in that a few minor repairs are needed, along with some refinishing. All major components still functional and contributing toward an extended life expectancy. Effective age and utility is standard for like properties of its class and usage.

4 = Good- No obvious maintenance required but neither is everything new. Appearance and utility are above the standard and the overall effective age will be lower than the typical property.

5= Very Good- All items well maintained, many having been overhauled and repaired as they have shown signs of wear, increasing the life expectancy and lowering the effective age with little deterioration or obsolescence evident with a high degree of utility.

BUILDING GRADE Represents the construction quality of improvements. Grades run from grade 1 to 13. Generally defined as:

1-3 Falls short of minimum building standards. Normally cabin or inferior structure.

4 Generally older, low quality construction. Does not meet code.

5 Low construction costs and workmanship. Small, simple design.

6 Lowest grade currently meeting building code. Low quality materials and simple designs.

7 Average grade of construction and design. Commonly seen in plats and older sub-divisions.

8 Just above average in construction and design. Usually better materials in both the exterior and interior finish work.

9 Better architectural design with extra interior and exterior design and quality.

10 Homes of this quality generally have high quality features. Finish work is better and more design quality is seen in the floor plans. Generally have a larger square footage.

11 Custom design and higher quality finish work with added amenities of solid woods, bathroom fixtures and more luxurious options.

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