

# Bank Helper

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# Summary

Our stakeholder is a mortgage lender who would like more accurate appraisals to reduce risk for home loans. We analyzed the King County (CA) House Sales dataset using machine learning to develop a model for predicting the value of a house. The model accurately predicts the value of a house with information available to the bank at time of appraisal, and would be a good tool for making loan decisions. We recommend using this model along with existing appraisers to reduce risk and increase profit margins.



# Outline

- Business Problem
- Data
- Results
- Conclusions
- References



# Business Problem

Maximize the number of appraisals which are between 80% and 105% of the true value of the house in order to minimize risk while remaining attractive to borrowers.



# Data

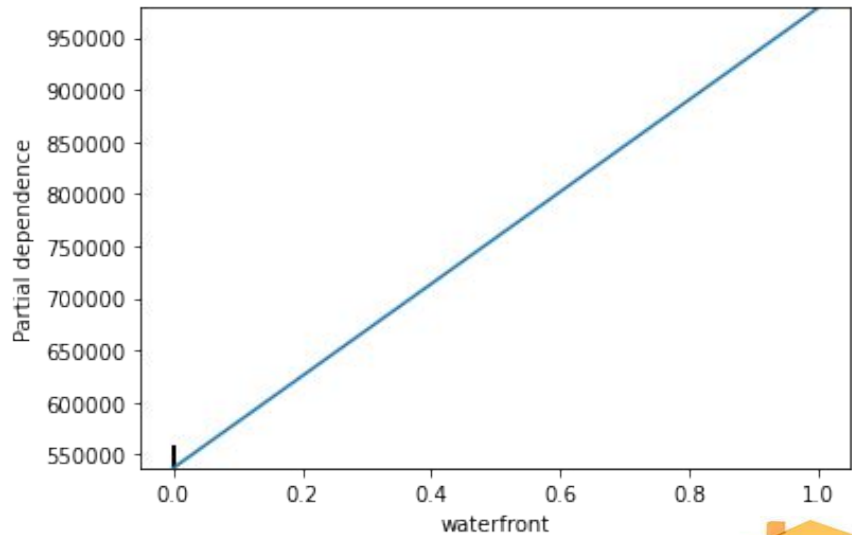
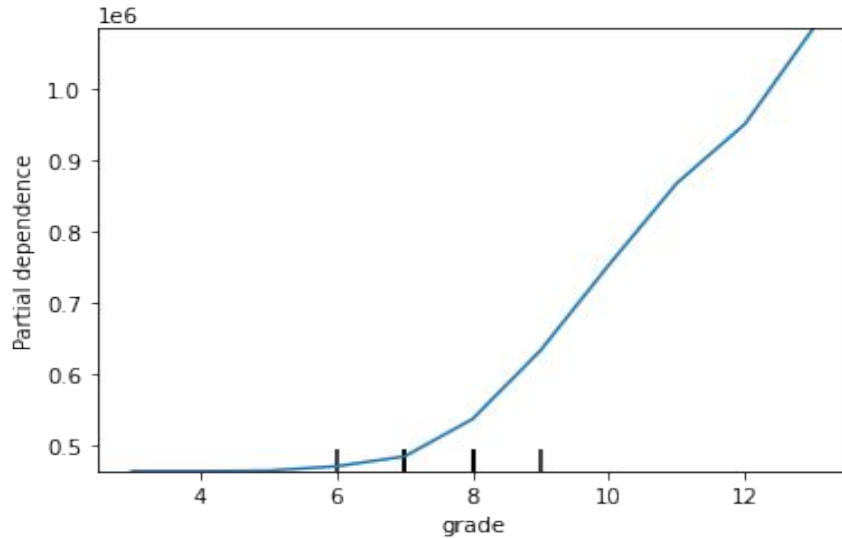
King County (CA) House Sales dataset  
(2014–2015).

- Largest Factors
  - Grade & Waterfront
  - Location
  - Square Footage
- Fun Factors
  - Season & Nearby houses
  - Year Renovated & Built
  - Condition & Floors



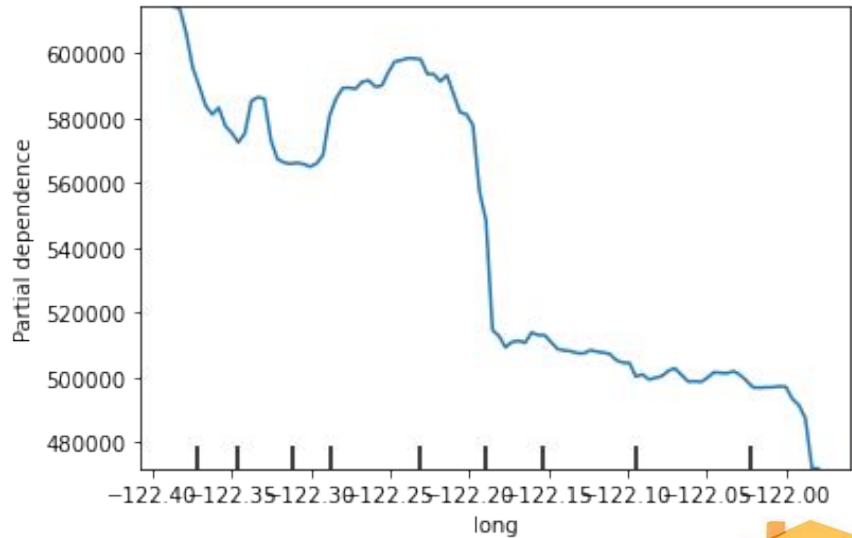
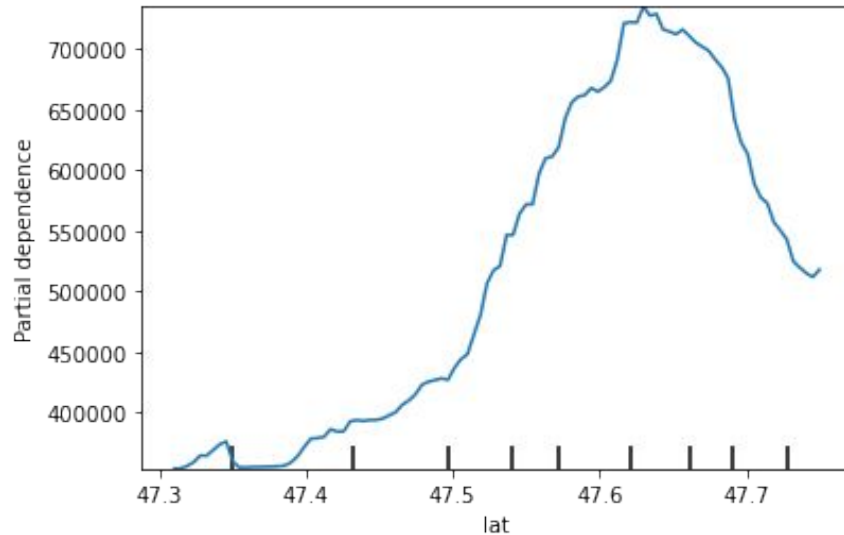
# Largest Factors:

## Grade & Waterfront



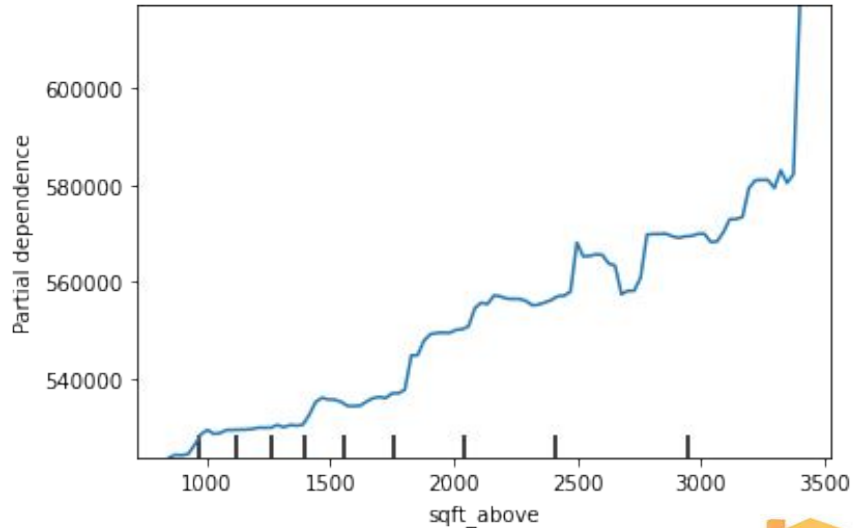
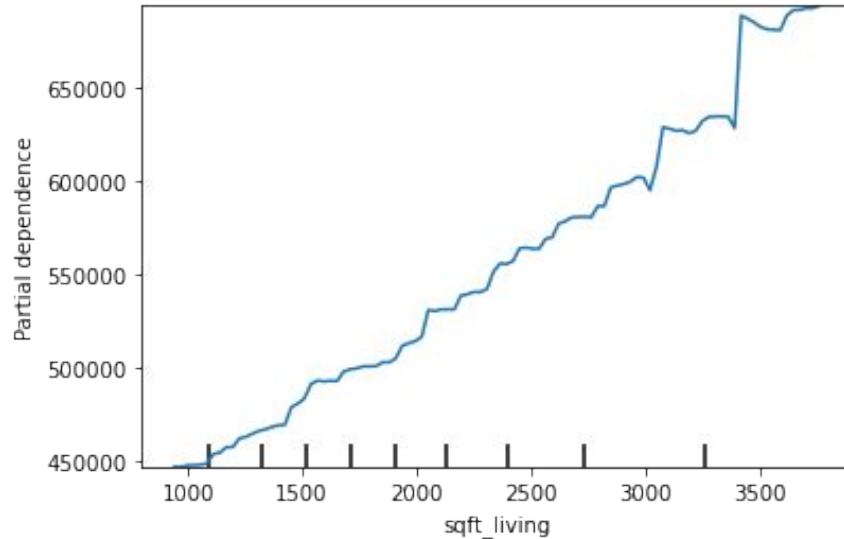
# Largest Factors:

## Location (Latitude & Longitude)



# Largest Factors:

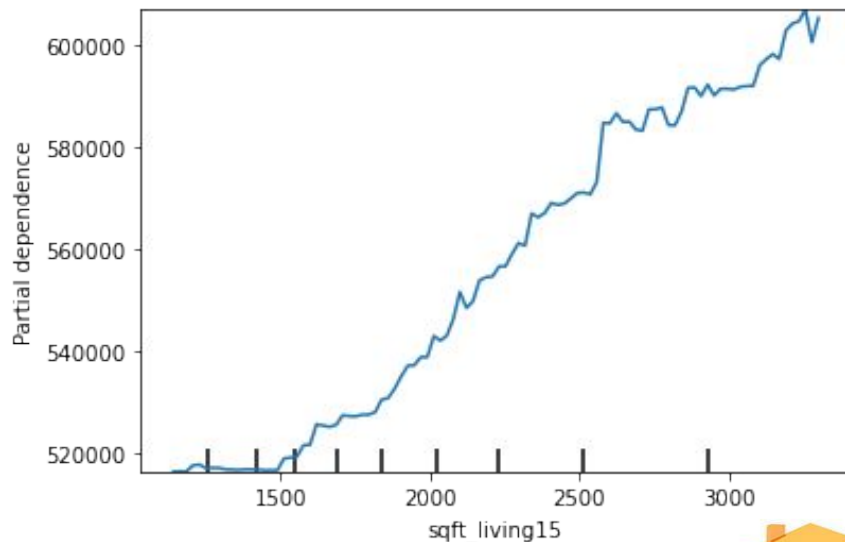
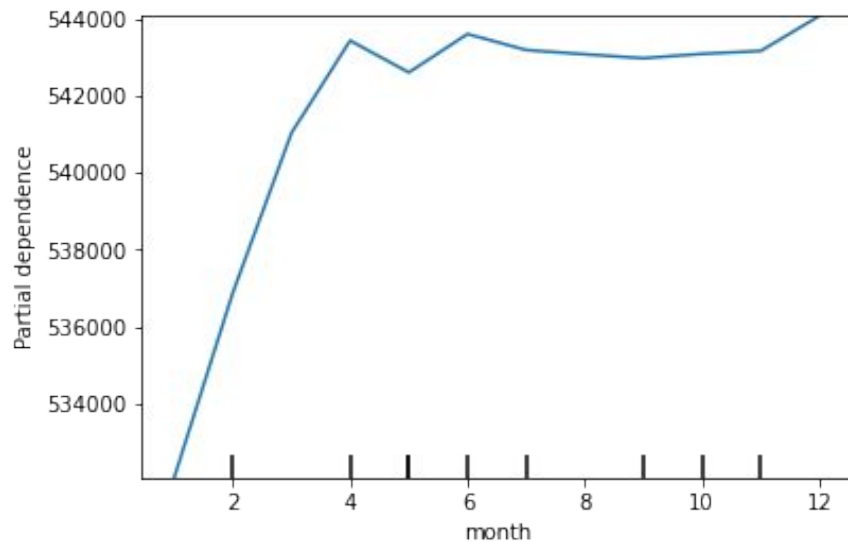
## Square Footage





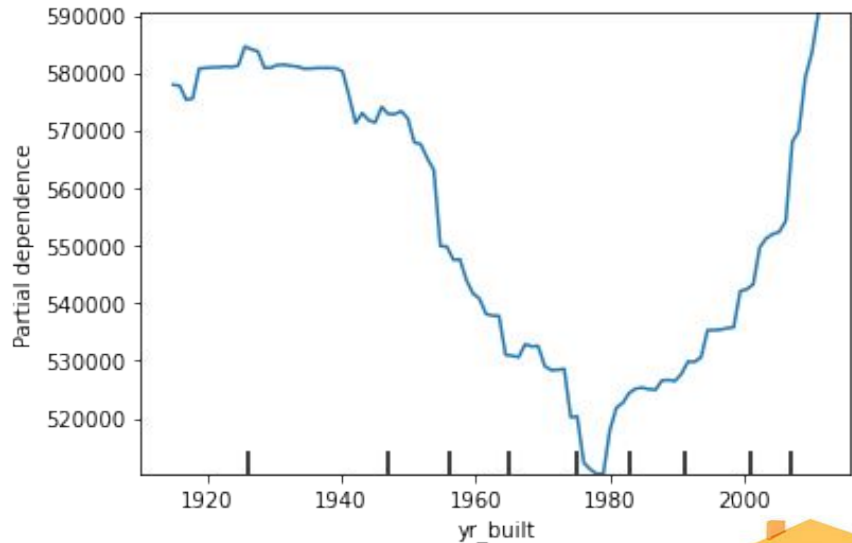
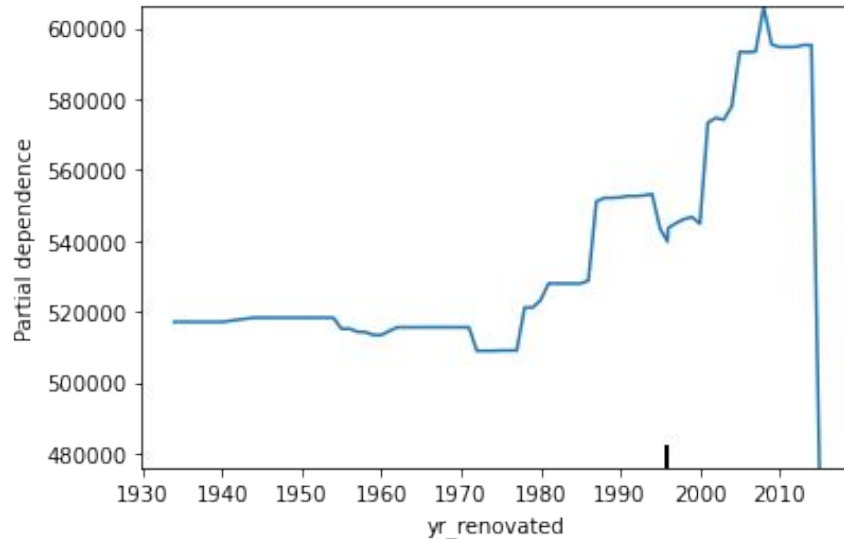
# Fun Fact:

## Season & Nearby houses



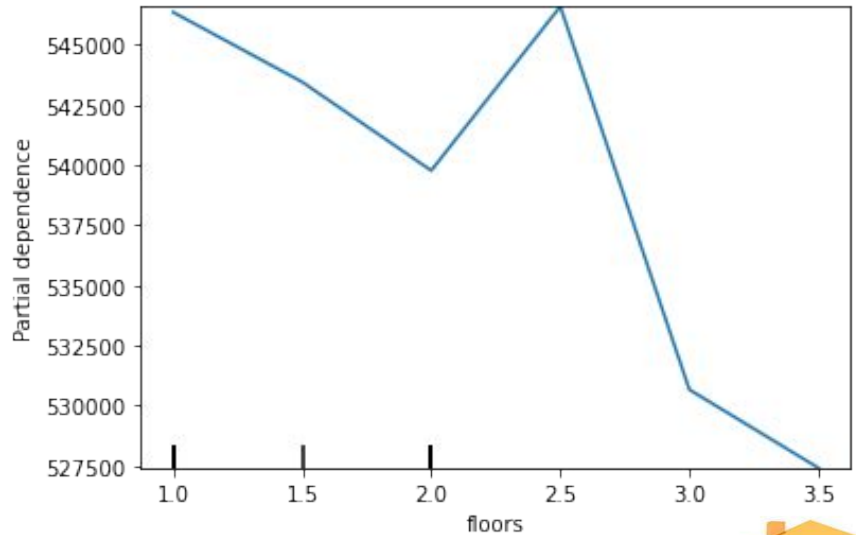
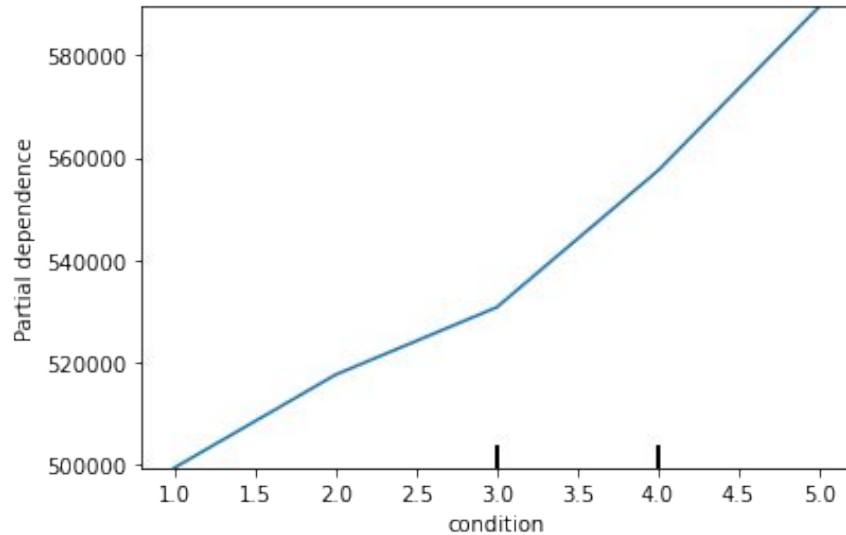
# Fun Fact:

## Year Renovated & Built



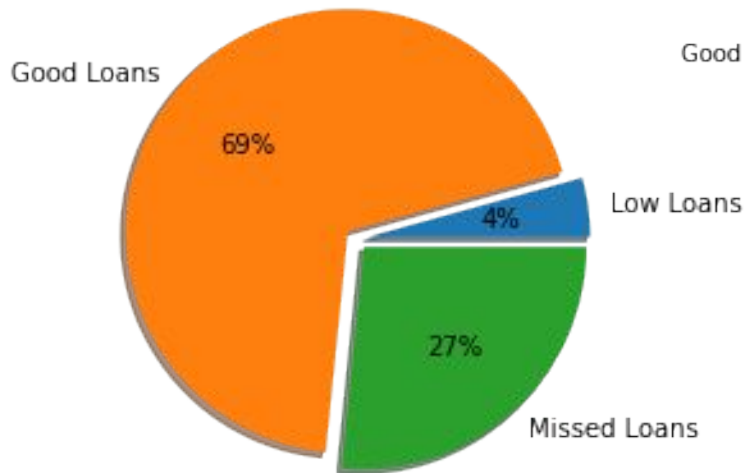
# Fun Fact:

## Condition & Floors

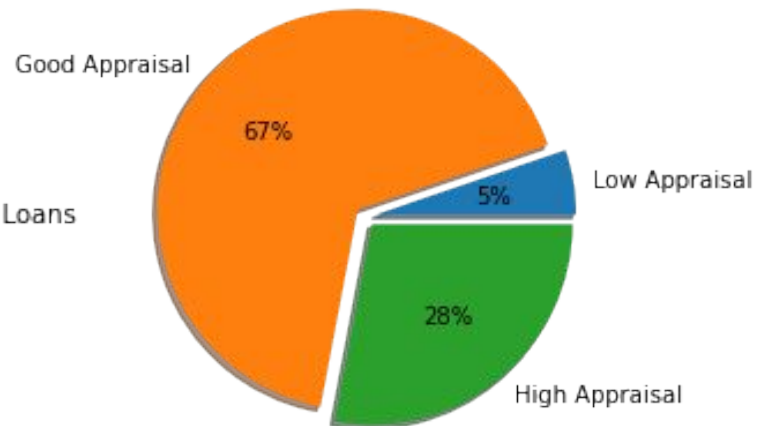


# Results

## Loan Values



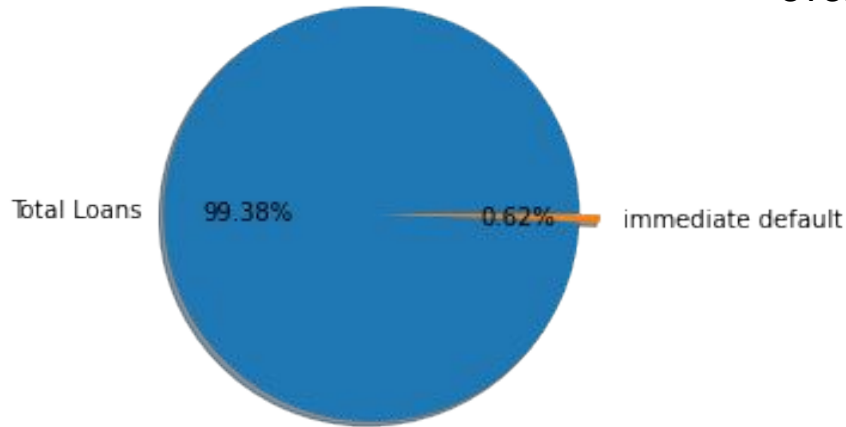
## Number of Appraisal



# Potential Losses

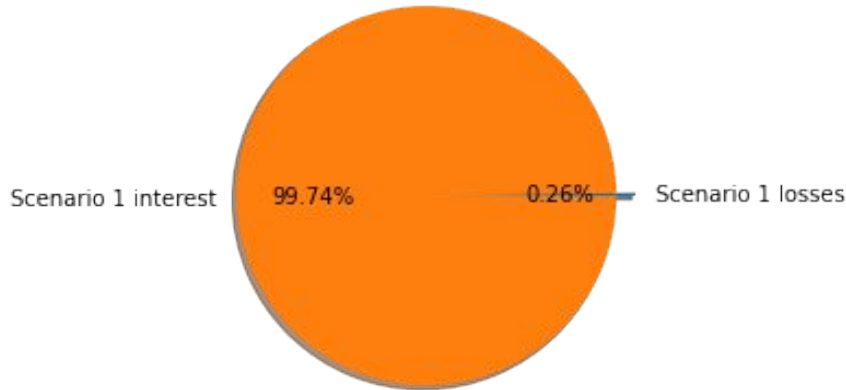
## Potential Losses

Total value of loans vs Amount of money lost if every borrower defaulted immediately



# Assumptions:

## 12% Default Rate, 2% APR



- 12% default rate (historically high)
- 2% APR for all loans (historically low)
- All defaults go into immediate foreclosure and sell for their sale price.
- All non-defaulting loans end up paid in full



# Conclusions

- The model is very good at predicting house prices in 2014–2015.
- Using model for appraisals should be profitable!
- Market crashes have not been analyzed (house value dropping after purchase)



# Future

- Train on more data including different years
- Use more realistic assumptions of default rate and APR to evaluate whether this model is more profitable than client's existing process.





# References

Board of Governors of the Federal Reserve System (US). (2021, January 30). *Delinquency Rate on Single-Family Residential Mortgages, Booked in Domestic Offices, All Commercial Banks*. Retrieved from <https://fred.stlouisfed.org/series/DRSFRMACBS>

Berger, R. (2020, October 23). *Mortgage Rates Fall To 50-Year Low*. Retrieved from <https://www.forbes.com/sites/robertberger/2020/10/23/mortgage-rates-fall-to-50-year-low/?sh=5d7da1b33323>





# Thank You!

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