**Used Vehicle Price Analysis & Strategy Report**

**Audience:** Used Car Dealerships  
**Goal:** Identify factors driving used car prices and provide recommendations

**1. Project Summary**

We analyzed over **426,000** vehicle listings to determine what factors most influence price and how dealers can make smarter purchase and resale decisions. Two regression models were used:

* **Linear Regression**
* **Ridge Regression** (to try to avoid overfitting)

**2. Data Preparation**

* Removed entries with missing or unrealistic values (e.g., price < $1,000 or year < 1980)
* Created features such as follows:
  + **Car Age** = 2025 − Year
  + **Price per Mile** = Price / Odometer
* Focused on more important vehicle attributes such as make, year, mileage, condition, fuel type, transmission, etc.

**3. Model Performance Comparison**

| **Metric** | **Linear Regression** | **Ridge Regression** |
| --- | --- | --- |
| **MAE** | $5,717.50 | $5,746.00 |
| **RMSE** | $8,547.24 | $8,591.68 |
| **R² Score** | 0.66 | 0.66 |

Both models performed similarly, explaining ~66% of the price variability.  
Ridge Regression slightly stabilizes predictions by reducing extreme coefficients.

**4. Key Factors Driving Price**

Top predictors of high price (from both models combined):

| **Feature** | **Influence** |
| --- | --- |
| Ferrari (manufacturer) | Very High |
| Aston Martin | High |
| Tesla | High |
| 12-cylinder engines | High |
| Diesel fuel | Moderate |
| Datsun | Moderate |
| Morgan | Strong |
| Fiat | Moderate |

*Luxury brands and performance features (i.e. engine type and fuel) command premium prices.*

**5. Recommendations for Inventory Strategy**

1. **Focus on Value-Rich Brands**: Seek out Ferrari, Tesla, Aston Martin, Porsche for high ROI units—even older models retain high resale value.
2. **Target Lower-Mileage Inventory**: Vehicles with less wear-and-tear (odometer < 100K) fetch consistently higher prices.
3. **Evaluate Engine and Fuel Type**: Diesel, hybrid, and high-cylinder engines trend positively with pricing.
4. **Track Condition Consistently**: Well-documented “excellent” or “good” condition listings show significantly stronger pricing trends.
5. **Be Selective with Niche Brands**: Some brands like Morgan and Fiat trend negatively in resale markets.

**6. Next Steps**

* Integrate this model into your dealership pricing software or CRM.
* Use filters on sourcing platforms to prioritize inventory matching high-value profiles.
* Consider expanding this analysis by region or seasonality (future iterations possible).