Fiat-Vehicle-Selection(LASSO-RIDGE)

In [1]:

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
df=pd.read_csv(r"C:\Users\prajapath Arjun\Downloads\fiat500_VehicleSelection_Dataset.csv")
print(df)
```

```
        ID   model  engine_power  age_in_days      km  previous_owners
0        1  lounge            51          882   25000                1  \
1        2     pop            51         1186   32500                1
2        3   sport            74         4658  142228                1
3        4  lounge            51         2739  160000                1
4        5     pop            73         3074  106880                1
...    ...     ...           ...          ...     ...              ...
1533  1534   sport            51         3712  115280                1
1534  1535  lounge            74         3835  112000                1
1535  1536     pop            51         2223   60457                1
1536  1537  lounge            51         2557   80750                1
1537  1538     pop            51         1766   54276                1

            lat        lon  price
0     44.907242   8.611560   8900
1     45.666359  12.241890   8800
2     45.503300  11.417840   4200
3     40.633171  17.634609   6000
4     41.903221  12.495650   5700
...         ...        ...    ...
1533  45.069679   7.704920   5200
1534  45.845692   8.666870   4600
1535  45.481541   9.413480   7500
1536  45.000702   7.682270   5990
1537  40.323410  17.568270   7900

[1538 rows x 9 columns]
```

In [2]:

```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn import preprocessing,svm
```

In [3]:

```
df=df[['km','price']]
df.columns=['Km','Price']
```

In [4]:

```
df.head(10)
```

Out[4]:

	Km	Price
0	25000	8900
1	32500	8800
2	142228	4200
3	160000	6000
4	106880	5700
5	70225	7900
6	11600	10750
7	49076	9190
8	76000	5600
9	89000	6000

In [5]:

```
df.tail()
```

Out[5]:

	Km	Price
1533	115280	5200
1534	112000	4600
1535	60457	7500
1536	80750	5990
1537	54276	7900

In [6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1538 entries, 0 to 1537
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Km      1538 non-null   int64
 1   Price   1538 non-null   int64
dtypes: int64(2)
memory usage: 24.2 KB
```

In [7]:

```
df.describe()
```

Out[7]:

	Km	Price
count	1538.000000	1538.000000
mean	53396.011704	8576.003901
std	40046.830723	1939.958641
min	1232.000000	2500.000000
25%	20006.250000	7122.500000
50%	39031.000000	9000.000000
75%	79667.750000	10000.000000
max	235000.000000	11100.000000

In [8]:

```
df.shape
```

Out[8]:

```
(1538, 2)
```

In [9]:

```
df.isnull().sum()
```

Out[9]:

```
Km       0
Price    0
dtype: int64
```

In [10]:

```
x=np.array(df['Km']).reshape(-1,1)
y=np.array(df['Price']).reshape(-1,1)
```

In [11]:

```
df.dropna(inplace=True)
```

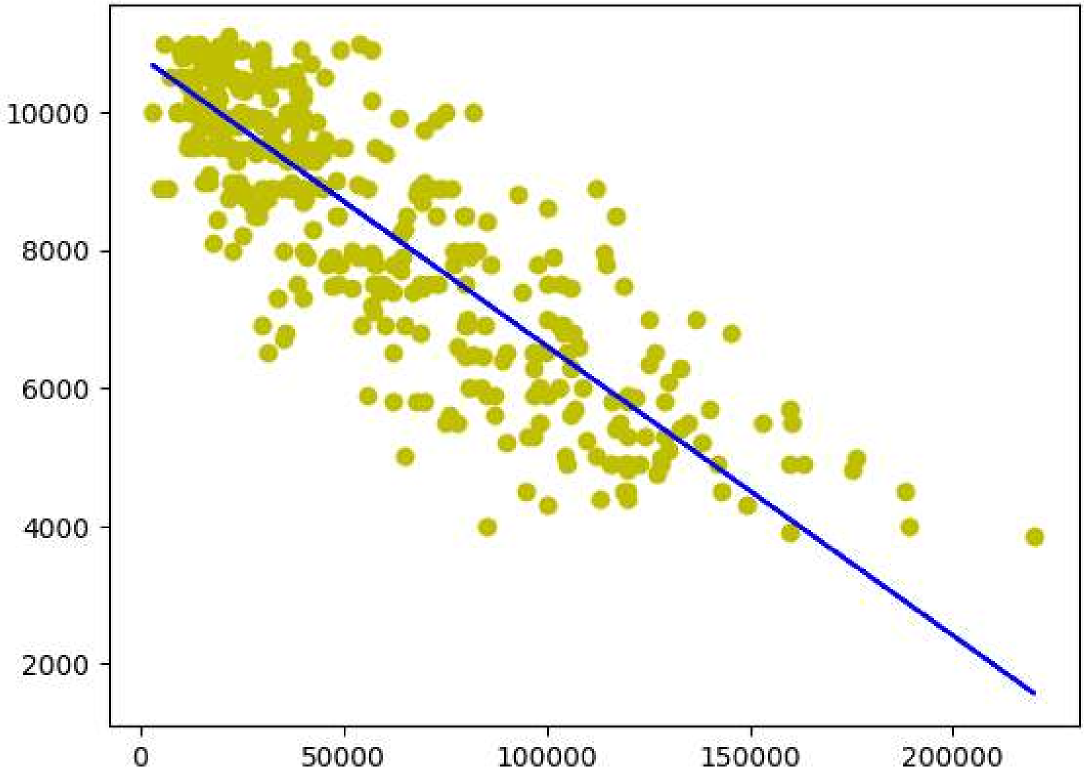
In [12]:

```
X_train,X_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
regr=LinearRegression()
regr.fit(X_train,y_train)
regr.fit(X_train,y_train)
print(regr.score(X_test,y_test))
```

0.7298610434355204

In [13]:

```
y_pred=regr.predict(X_test)
plt.scatter(X_test,y_test,color='y')
plt.plot(X_test,y_pred,color='b')
plt.show()
```

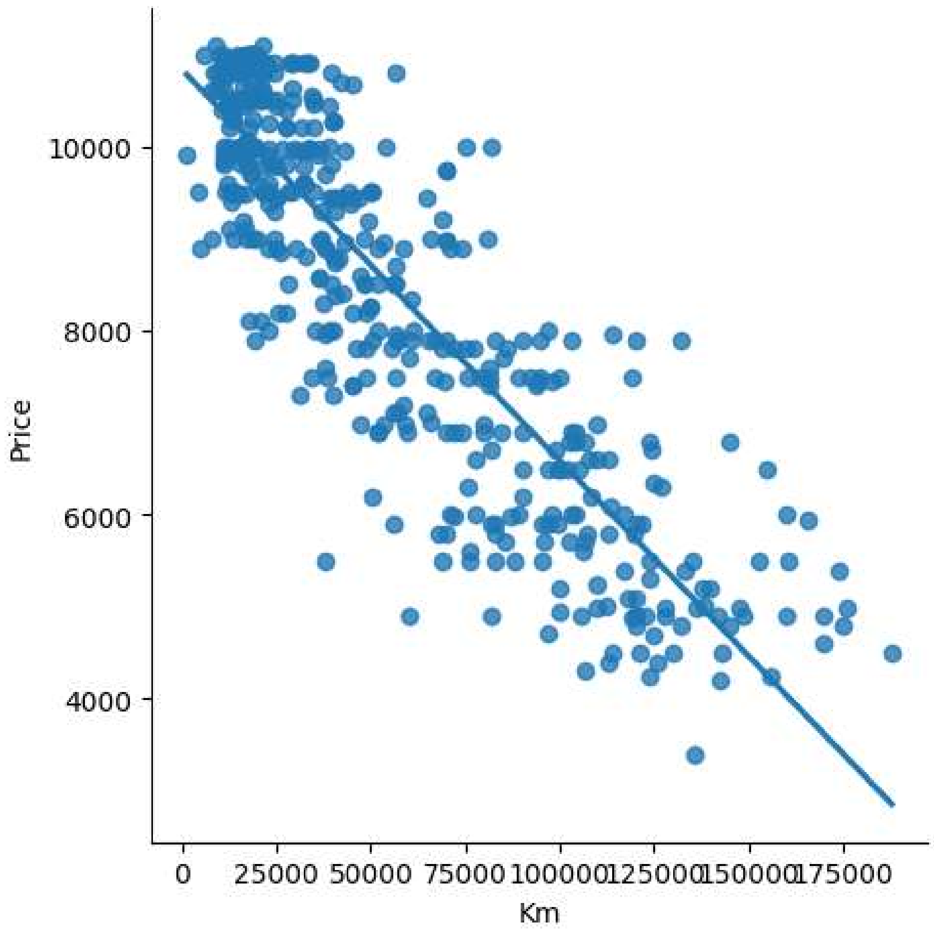


In [14]:

```
udf=df[:][:500]
sns.lmplot(x="Km",y="Price",data=udf,order=1,ci=None)
```

Out[14]:

<seaborn.axisgrid.FacetGrid at 0x233c9a08610>



In [15]:

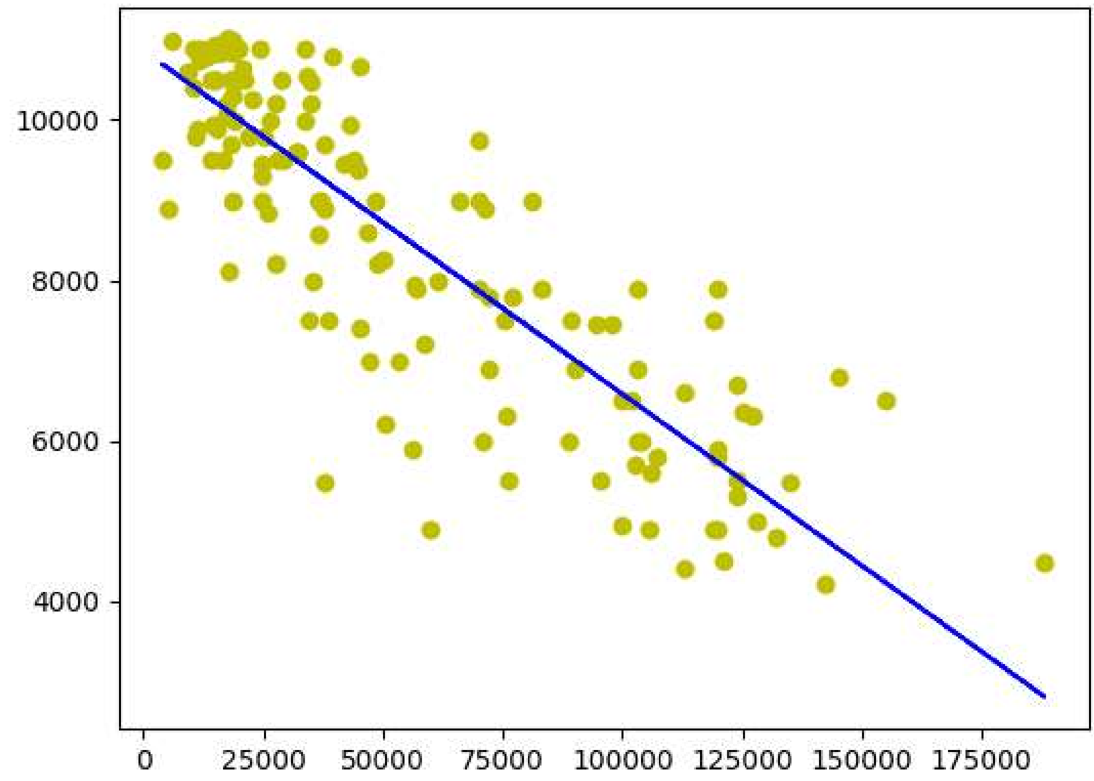
```
udf.fillna(method='ffill',inplace=True)
X=np.array(udf['Km']).reshape(-1,1)
y=np.array(udf['Price']).reshape(-1,1)
udf.dropna(inplace=True)
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3)
regr.fit(X_train,y_train)
```

Out[15]:

```
▾ LinearRegression
LinearRegression()
```

In [16]:

```
y_pred=regr.predict(X_test)
plt.scatter(X_test,y_test,color='y')
plt.plot(X_test,y_pred,color='b')
plt.show()
```



In [17]:

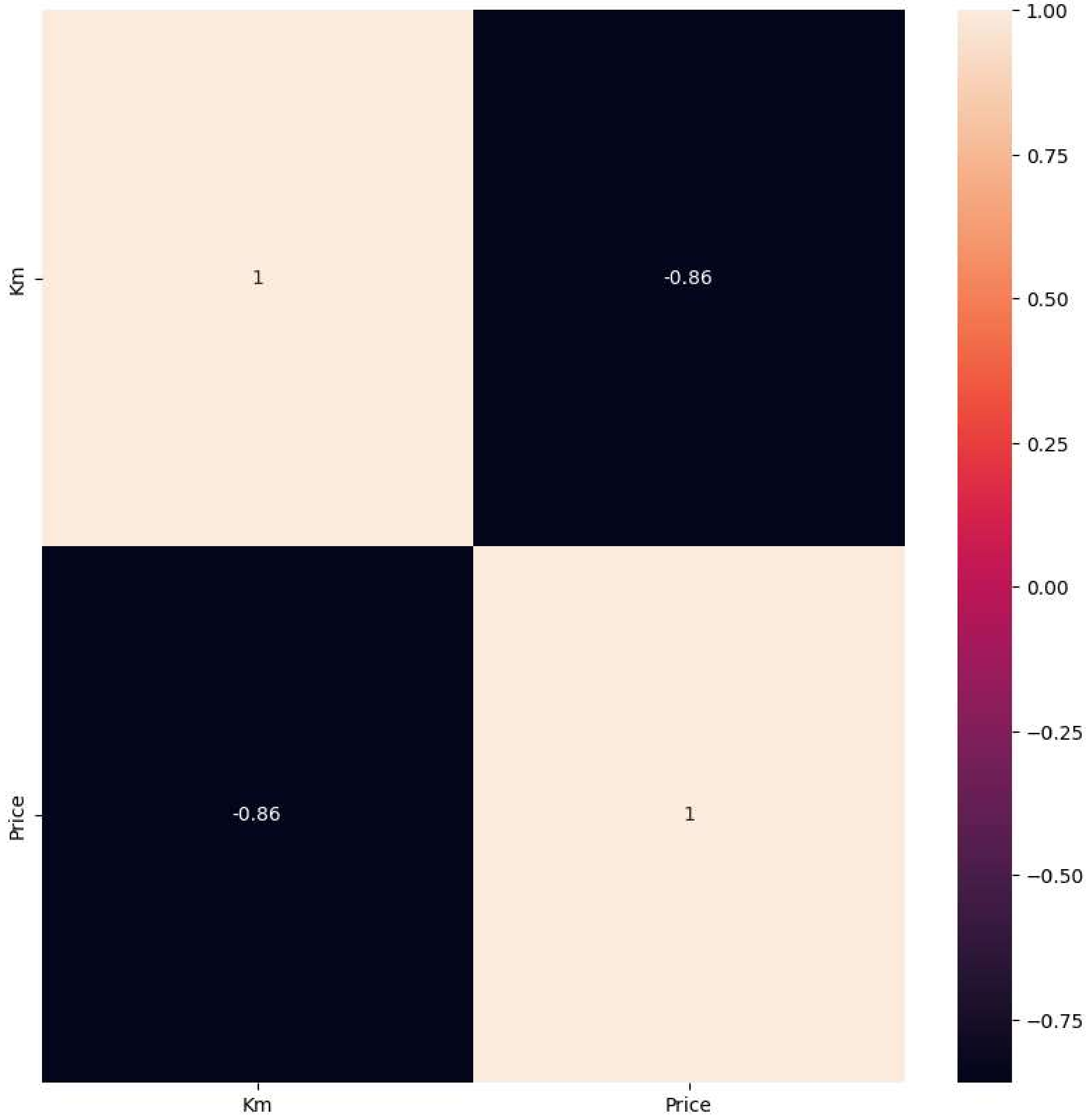
```
from sklearn.linear_model import Ridge,Lasso,RidgeCV,LassoCV
```

In [19]:

```
plt.figure(figsize=(10,10))
sns.heatmap(df.corr(),annot=True)
```

Out[19]:

<Axes: >



In [20]:

```
from sklearn.preprocessing import StandardScaler
features=df.columns[0:2]
target=df.columns[-1]
X=df[features].values
y=df[target].values
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3,random_state=17)
print("The dimension of X_train is {}".format(X_train.shape))
print("The dimension of X_test is {}".format(X_test.shape))
scaler=StandardScaler()
X_train=scaler.fit_transform(X_train)
X_test=scaler.transform(X_test)
```

```
The dimension of X_train is (1076, 2)
The dimension of X_test is (462, 2)
```

In [21]:

```
#Linear regression model
regr=LinearRegression()
regr.fit(X_train,y_train)
actual=y_test #actual value
train_score_regr=regr.score(X_train,y_train)
test_score_regr=regr.score(X_test,y_test)
print("\nLinear model:\n")
print("The train score for Linear model is {}".format(train_score_regr))
print("The test score for Linear model is {}".format(test_score_regr))
```

```
Linear model:

The train score for Linear model is 1.0
The test score for Linear model is 1.0
```

In [22]:

```
#ridge regression model
ridgeReg=Ridge(alpha=10)
ridgeReg.fit(X_train,y_train)
#train and test score for ridge regression
train_score_ridge=ridgeReg.score(X_train,y_train)
test_score_ridge=ridgeReg.score(X_test,y_test)
print("\nRidge model:\n")
print("The train score for ridge model is {}".format(train_score_ridge))
print("The test score for ridge model is {}".format(test_score_ridge))
```

```
Ridge model:

The train score for ridge model is 0.9997095924476732
The test score for ridge model is 0.9997198323998524
```

In [23]:

```
#using the linear cv model for ridge regression
from sklearn.linear_model import RidgeCV
#ridge cross validation
ridge_cv=RidgeCV(alphas=[0.0001,0.001,0.01,0.1,1,10]).fit(X_train,y_train)
#score
print(ridge_cv.score(X_train,y_train))
print(ridge_cv.score(X_test,y_test))
```

```
0.9999999999999668
0.999999999999968
```

In [25]:

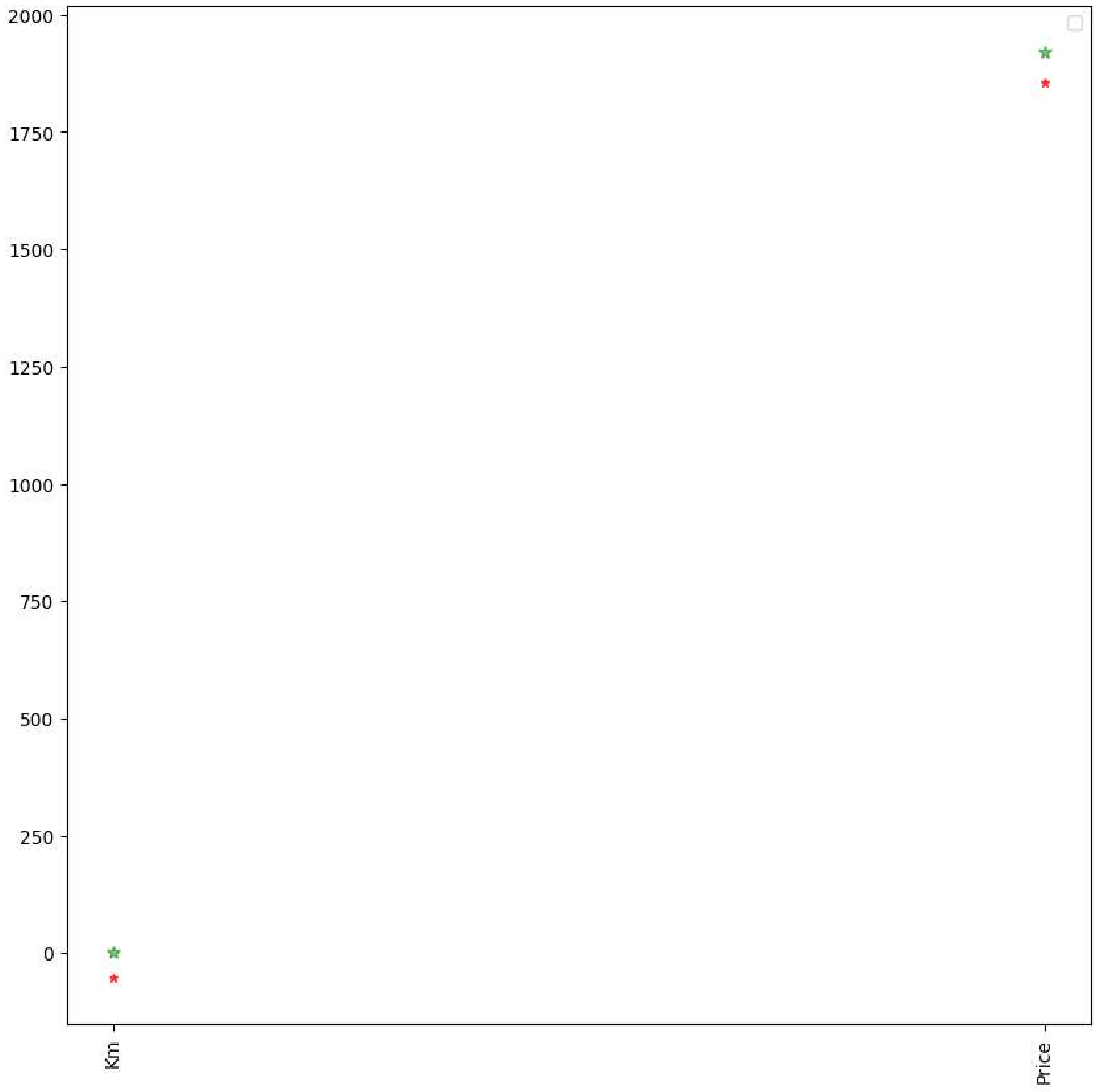
```
#using the linear cv model for lasso regression
from sklearn.linear_model import LassoCV
#lasso cross validation
lasso_cv=LassoCV(alphas=[0.0001,0.001,0.01,0.1,1,10],random_state=0).fit(X_train,y_train)
#score
print(lasso_cv.score(X_train,y_train))
print(lasso_cv.score(X_test,y_test))
```

```
0.9999999877496772
0.9999999874481674
```

In [27]:

```
plt.figure(figsize=(10,10))
plt.plot(features,ridgeReg.coef_,alpha=0.7,linestyle='none',marker='*',markersize=5,color='re
plt.plot(features,regr.coef_,alpha=0.5,linestyle='none',marker='*',markersize=7,color='green'
plt.xticks(rotation=90)
plt.legend()
plt.show()
```

```
No artists with labels found to put in legend.  Note that artists whose label s
tart with an underscore are ignored when legend() is called with no argument.
```

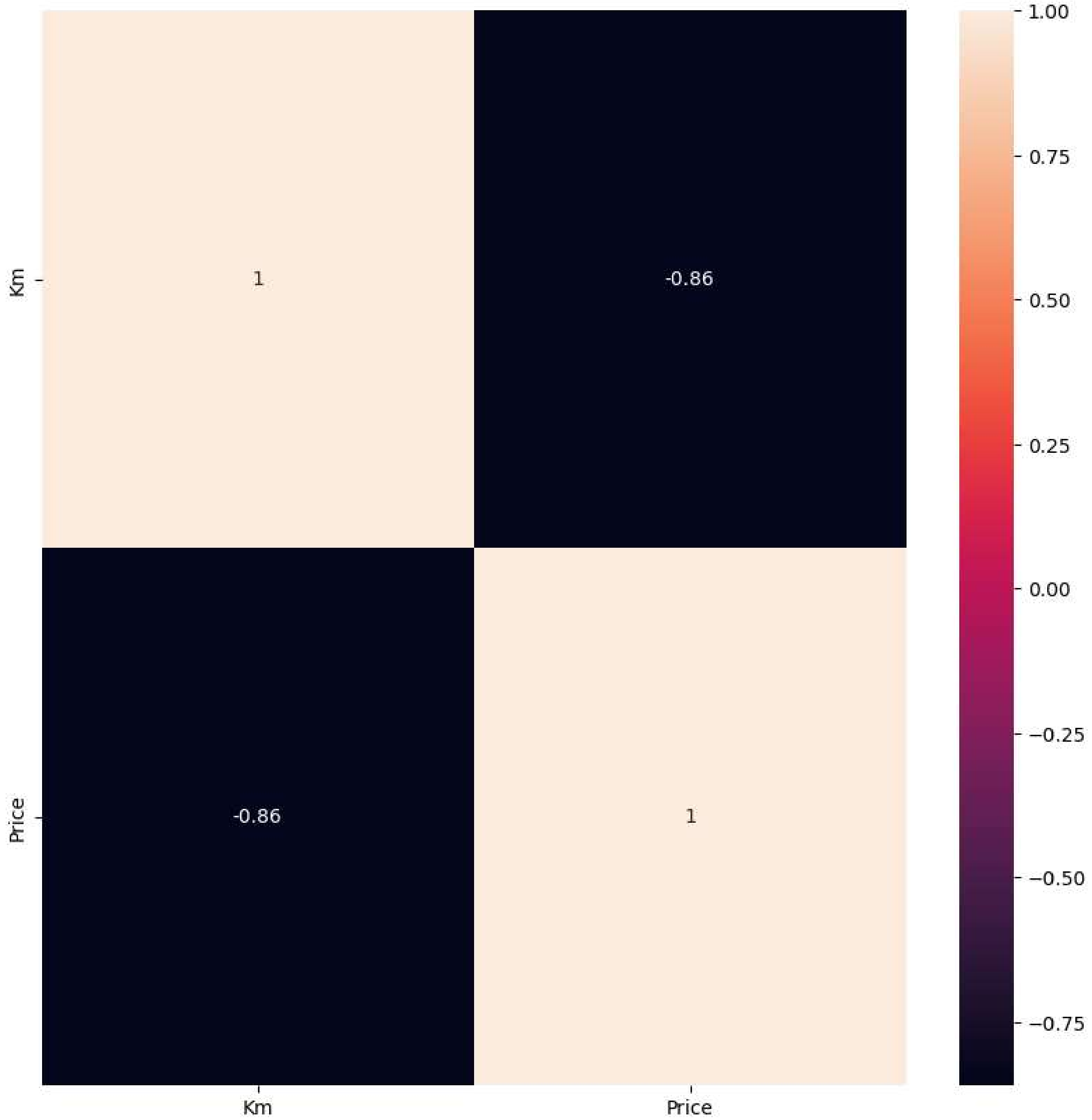


In [28]:

```
#ridge regression
plt.figure(figsize=(10,10))
sns.heatmap(df.corr(),annot=True)
```

Out[28]:

```
<Axes: >
```



In [29]:

```
#lasso regression model
lassoReg=Lasso(alpha=10)
lassoReg.fit(X_train,y_train)
#train and test score for ridge regression
train_score_lasso=lassoReg.score(X_train,y_train)
test_score_lasso=lassoReg.score(X_test,y_test)
print("\nLasso model:\n")
print("The train score for lasso model is {}".format(train_score_lasso))
print("The test score for lasso model is {}".format(test_score_lasso))
```

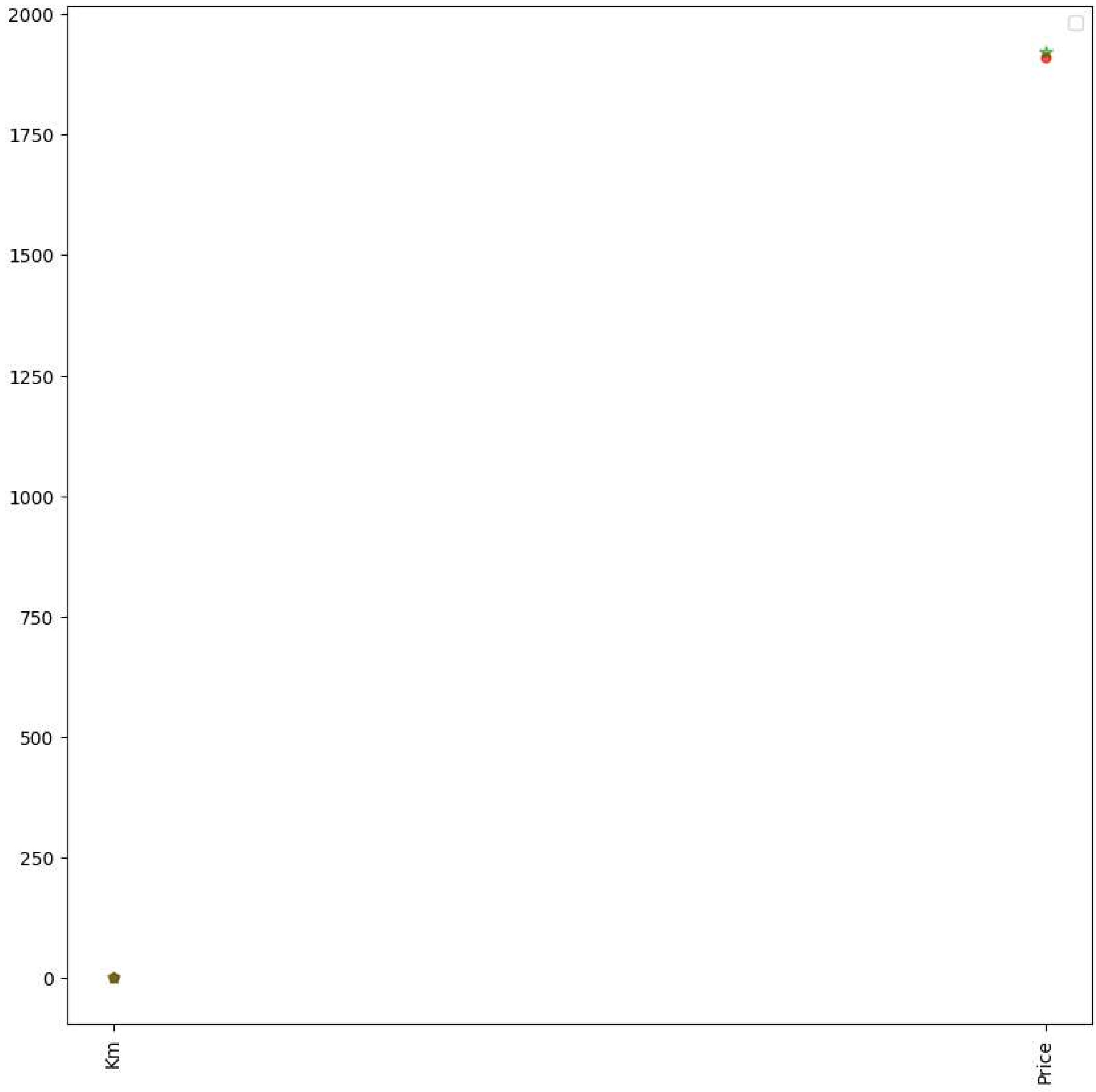
```
Lasso model:

The train score for lasso model is 0.9999728562194999
The test score for lasso model is 0.9999728508562553
```

In [30]:

```
plt.figure(figsize=(10,10))
plt.plot(features,lassoReg.coef_,alpha=0.7,linestyle='none',marker='o',markersize=5,color='re
plt.plot(features,regr.coef_,alpha=0.5,linestyle='none',marker='*',markersize=7,color='green'
plt.xticks(rotation=90)
plt.legend()
plt.show()
```

```
No artists with labels found to put in legend.  Note that artists whose label s
tart with an underscore are ignored when legend() is called with no argument.
```

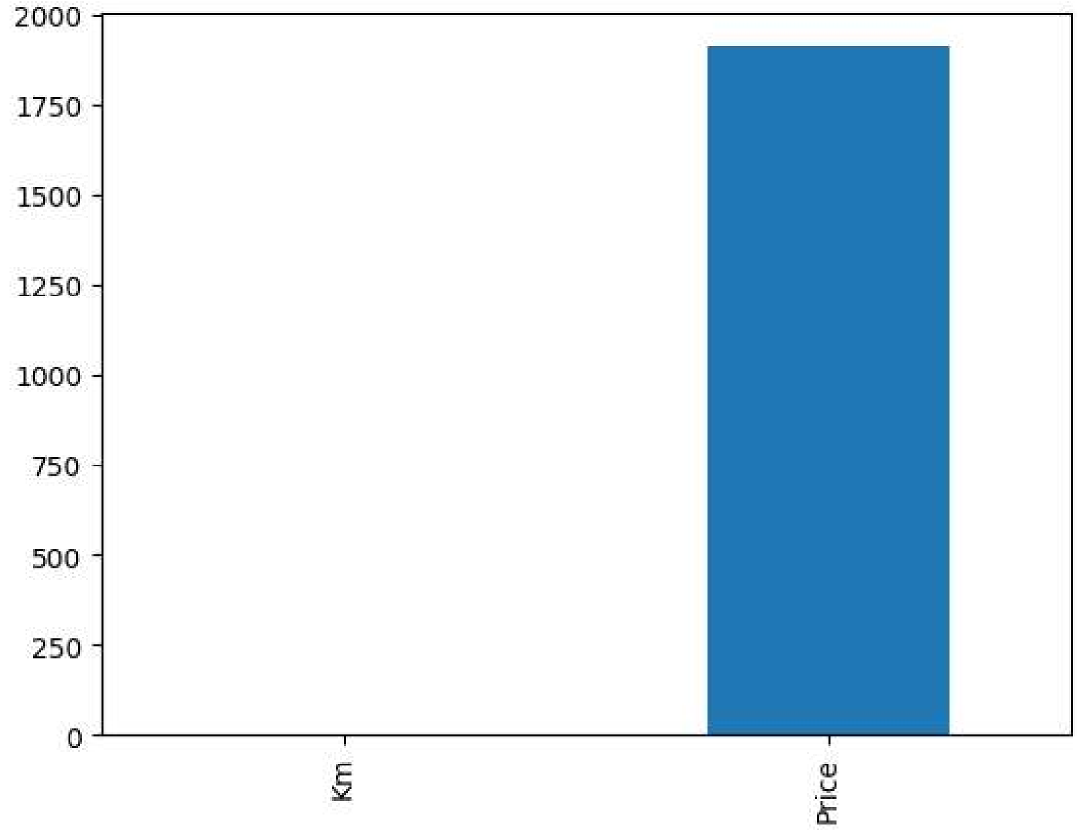


In [31]:

```
pd.Series(lassoReg.coef_,features).sort_values(ascending=True).plot(kind="bar")
```

Out[31]:

```
<Axes: >
```



In [32]:

```
#plot size
plt.figure(figsize=(10,10))
#add plot for ridge regression
plt.plot(features,ridgeReg.coef_,alpha=0.7,linestyle='none',marker='*',markersize=5,color='re
#add plot for lasso regression
plt.plot(features,lassoReg.coef_,alpha=0.7,linestyle='none',marker='*',markersize=5,color='or
#add plot for linear model
plt.plot(features,regr.coef_,alpha=0.5,linestyle='none',marker='*',markersize=7,color='green'
#rotate axis
plt.xticks(rotation=90)
plt.legend()
plt.title("Comparison of Ridge,Lasso and Linear regression models")
plt.show()
```

```
No artists with labels found to put in legend.  Note that artists whose label s
tart with an underscore are ignored when legend() is called with no argument.
```