In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
```

In [2]:
```
df = pd.read_csv("Housing.csv")
df.head()
```

Out[2]:

	price	area	bedrooms	bathrooms	stories	mainroad	guestroom	basement	hotw
0	13300000	7420	4	2	3	yes	no	no	
1	12250000	8960	4	4	4	yes	no	no	
2	12250000	9960	3	2	2	yes	no	yes	
3	12215000	7500	4	2	2	yes	no	yes	
4	11410000	7420	4	1	2	yes	yes	yes	

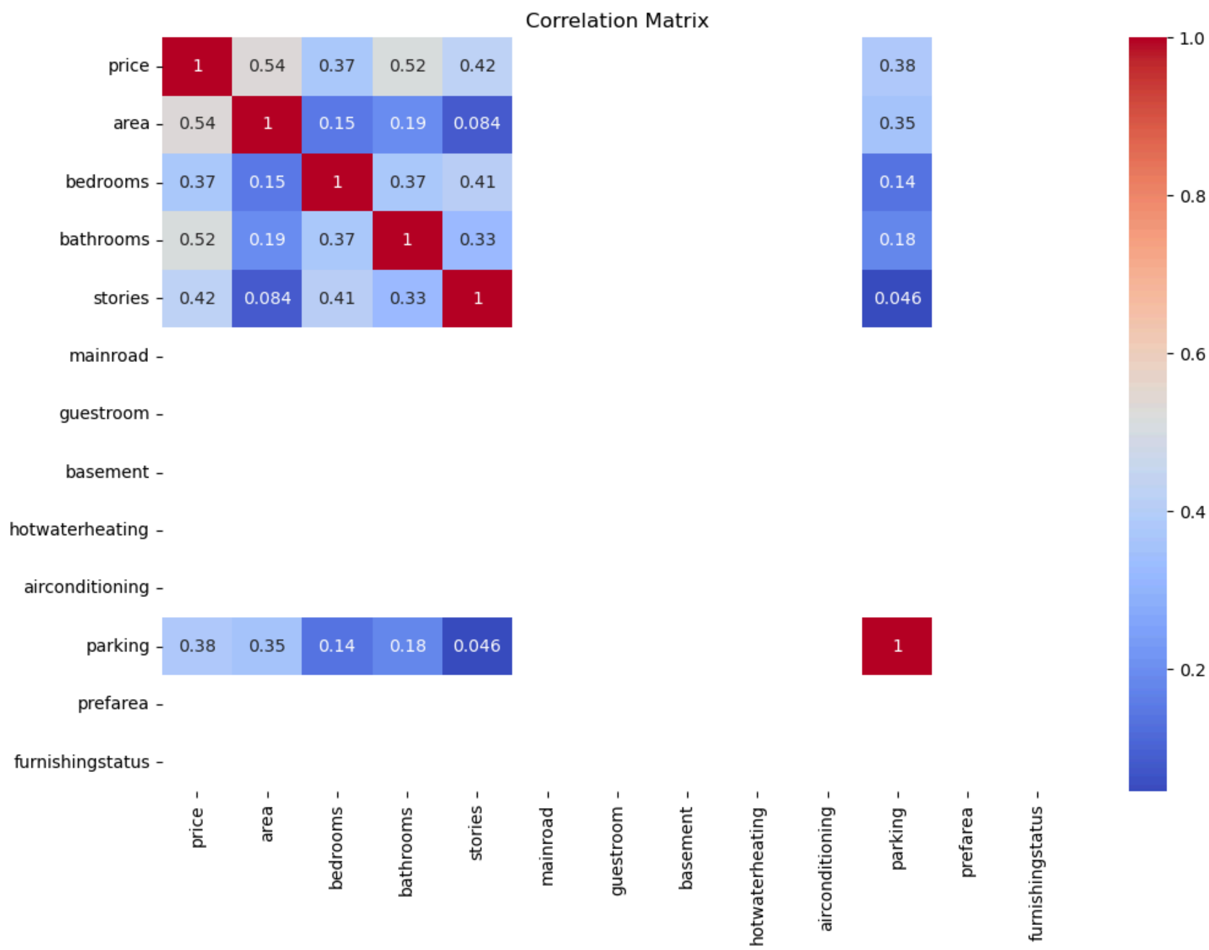
In [21]:
```
binary_cols = ['mainroad', 'guestroom', 'basement', 'hotwaterheating', 'airconditio
for col in binary_cols:
    df[col] = df[col].map({'yes': 1, 'no': 0})
    df[col] = df[col].fillna(0)

df['furnishingstatus'] = df['furnishingstatus'].map({'unfurnished': 0, 'semi-furnis
df['furnishingstatus'] = df['furnishingstatus'].fillna(0)
```

In [22]:
```
df.isnull().sum()
```

Out[22]:
```
price               0
area                0
bedrooms            0
bathrooms           0
stories             0
mainroad            0
guestroom           0
basement            0
hotwaterheating     0
airconditioning     0
parking             0
prefarea            0
furnishingstatus    0
dtype: int64
```

In [23]:
```
plt.figure(figsize=(12,8))
sns.heatmap(df.corr(), annot=True, cmap='coolwarm')
plt.title("Correlation Matrix")
plt.show()
```



In [24]:
```
X = df.drop('price', axis=1)
y = df['price']
```

In [25]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_sta
```

In [26]:
```
model = LinearRegression()
model.fit(X_train, y_train)
```

Out[26]:
```
▾ LinearRegression

LinearRegression()
```

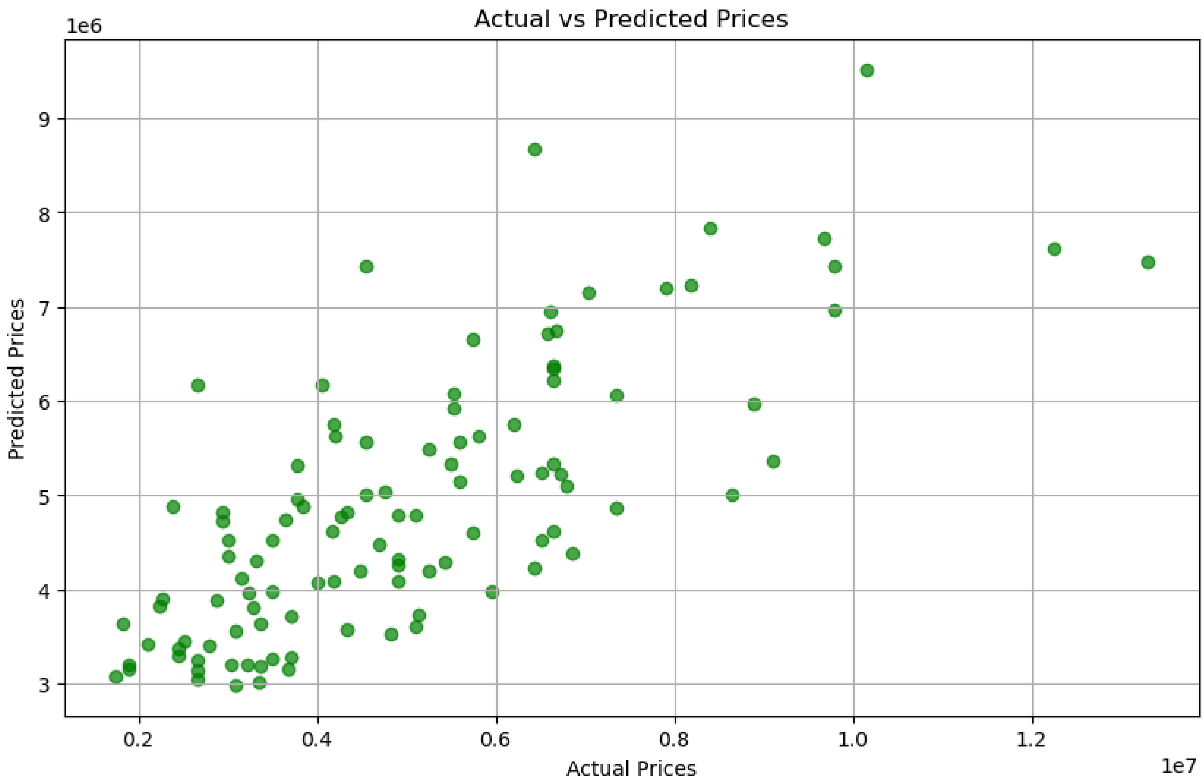
In [27]:
```
from sklearn.metrics import mean_absolute_error

y_pred = model.predict(X_test)

print("R² Score:", r2_score(y_test, y_pred))
print("Mean Squared Error:", mean_squared_error(y_test, y_pred))
print("Mean Absolute Error:", mean_absolute_error(y_test, y_pred))
```

```
R² Score: 0.5464062355495873
Mean Squared Error: 2292721545725.3613
Mean Absolute Error: 1127483.3523235186
```

In [28]:
```python
plt.figure(figsize=(10,6))
plt.scatter(y_test, y_pred, alpha=0.7, color='green')
plt.xlabel("Actual Prices")
plt.ylabel("Predicted Prices")
plt.title("Actual vs Predicted Prices")
plt.grid(True)
plt.show()
```



In [29]:
```python
# Final Recommendations & Insights
"""
- Area and number of stories show strong positive correlation with house price.
- Features like air conditioning, guestroom, and hot water heating significantly in
- The model explains approximately 54.6% of the variance in price (R² = 0.546).
- The average absolute error is around 1.12 million, which is reasonable given the
- Model performance can be improved using more advanced algorithms such as Random F
"""
```

Out[29]:
```
'\n- Area and number of stories show strong positive correlation with house pric
e.\n- Features like air conditioning, guestroom, and hot water heating significant
ly increase property value.\n- The model explains approximately 54.6% of the varia
nce in price (R² = 0.546).\n- The average absolute error is around 1.12 million, w
hich is reasonable given the scale of real estate prices.\n- Model performance can
be improved using more advanced algorithms such as Random Forest or Gradient Boost
ing.\n'
```

In [ ]:
```python
# Project Summary: House Price Prediction

This project uses Linear Regression to predict house prices based on various featur

Further improvements could include using more advanced models like Random Forest or
```