Predict the stock price using Lasso Regression

In [107…
```
# Import libraries

import yfinance as yf
```

In [3]:
```
# Download the Data from Yahoo Finance

tickers = ['AAPL', 'AMZN', 'MSFT', 'QQQ', '^GSPC']
df = yf.download(tickers, start = '2020-01-01', end = '2025-04-01')['Close']
df.head()
```

```
C:\Users\sahil\AppData\Local\Temp\ipykernel_668\909351943.py:4: FutureWarning: YF.do
wnload() has changed argument auto_adjust default to True
  df = yf.download(tickers, start = '2020-01-01', end = '2025-04-01')['Close']
[*********************100%***********************]  5 of 5 completed
```

Out[3]:

Ticker	AAPL	AMZN	MSFT	QQQ	^GSPC
Date					
2020-01-02	72.538528	94.900497	152.791138	208.848923	3257.850098
2020-01-03	71.833267	93.748497	150.888596	206.935898	3234.850098
2020-01-06	72.405670	95.143997	151.278625	208.269226	3246.280029
2020-01-07	72.065140	95.343002	149.899307	208.240295	3237.179932
2020-01-08	73.224403	94.598503	152.286957	209.805435	3253.050049

In [4]:
```
# Feature Engineering

df['AAPL(t-1)'] = df['AAPL'].shift(1)
df['AMZN(t-1)'] = df['AMZN'].shift(1)
df['MSFT(t-1)'] = df['MSFT'].shift(1)
df['QQQ(t-1)'] = df['QQQ'].shift(1)
df['^GSPC(t-1)'] = df['^GSPC'].shift(1)
```

In [5]:
```
df['AAPL(MA_5)'] = df['AAPL'].rolling(window=5).mean()
df['AMZN(MA_5)'] = df['AMZN'].rolling(window=5).mean()
df['MSFT(MA_5)'] = df['MSFT'].rolling(window=5).mean()
df['QQQ(MA_5)'] = df['QQQ'].rolling(window=5).mean()
df['^GSPC(MA_5)'] = df['^GSPC'].rolling(window=5).mean()
```

In [6]:
```
df['Target'] = df['AAPL'].shift(-1)
df.head()
```

Out[6]:

Ticker	AAPL	AMZN	MSFT	QQQ	^GSPC	AAPL(t-1)	AMZN(t-1)	M
Date								
2020-01-02	72.538528	94.900497	152.791138	208.848923	3257.850098	NaN	NaN	
2020-01-03	71.833267	93.748497	150.888596	206.935898	3234.850098	72.538528	94.900497	15
2020-01-06	72.405670	95.143997	151.278625	208.269226	3246.280029	71.833267	93.748497	15
2020-01-07	72.065140	95.343002	149.899307	208.240295	3237.179932	72.405670	95.143997	15
2020-01-08	73.224403	94.598503	152.286957	209.805435	3253.050049	72.065140	95.343002	14

In [7]:
```
df = df.dropna()
```

In [8]:
```
# Step for Lasso Regression

# 1. Import libraries
# 2. Define features and Target variables
# 3. Train Test split data
# 4. Apply Lasso Regression
# 5. Get Intercept & co-eff for Lasso Regression
# 6. Predict using Lasso Regression
# 7. Create a dataframe with Actual and Predicted values
# 8. Plot the graph between Actual and Predicted Prices
# 9. Evaluate the model - R Square, Mse, RMSE
```

In [9]:
```
# 1. Import libraries

import pandas as pd
import numpy as np
from sklearn.linear_model import Lasso
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score, mean_squared_error
```

In [10]:
```
# 2. Define features and Target variables

X = df[ ['AAPL(t-1)', 'AMZN(t-1)',
       'MSFT(t-1)', 'QQQ(t-1)', '^GSPC(t-1)', 'AAPL(MA_5)', 'AMZN(MA_5)',
       'MSFT(MA_5)', 'QQQ(MA_5)', '^GSPC(MA_5)' ] ]

Y = df['Target']
```

In [40]:
```
# 3. Train Test split data

X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.05, shuffle
```

In [92]:
```
# 4. Apply Lasso Regression

lasso = Lasso(alpha = 5)
lasso.fit(X_train, Y_train)
```

Out[92]:
```
Lasso
Lasso(alpha=5)
```

In [94]:
```
# 5. Get Intercept & co-eff for Lasso Regression

co_eff = lasso.coef_
co_eff

intercept = lasso.intercept_
intercept

coeff_df = pd.DataFrame( { 'Feature': X.columns, 'co-eff': co_eff} )
coeff_df
```

Out[94]:

	Feature	co-eff
0	AAPL(t-1)	0.585999
1	AMZN(t-1)	-0.000000
2	MSFT(t-1)	0.008888
3	QQQ(t-1)	0.000000
4	^GSPC(t-1)	0.001209
5	AAPL(MA_5)	0.373269
6	AMZN(MA_5)	-0.000000
7	MSFT(MA_5)	0.000000
8	QQQ(MA_5)	0.000000
9	^GSPC(MA_5)	0.000000

In [96]:
```
# 6. Predict using Lasso Regression

y_pred = lasso.predict(X_test)
y_pred
```

Out[96]:
```
array([249.1265135 , 252.25895389, 253.10587387, 255.74865984,
       256.64517918, 254.32424964, 251.85629347, 249.68937618,
       244.64641771, 243.70405423, 243.99811693, 241.66600386,
       241.46189765, 237.21951618, 234.91259709, 233.93039925,
       235.75987711, 229.60680891, 229.84739928, 224.91730613,
       224.7564522 , 224.29315934, 223.72581658, 228.83042712,
       235.06941751, 236.67061491, 236.41735105, 235.3148594 ,
       230.15094707, 232.50060675, 232.01949471, 231.88387281,
       228.48828305, 228.72248578, 231.97007545, 235.05121757,
       239.14726649, 242.17532446, 243.04038016, 244.00443486,
       244.85219974, 244.67830627, 245.70235808, 245.24352556,
       240.7205626 , 238.47745387, 240.60781741, 237.35123662,
       235.6941045 , 235.62422477, 235.01578935, 236.4230002 ,
       228.21939463, 222.89195941, 218.78324154, 212.47699664,
       213.92903608, 213.66521928, 212.6508662 , 214.58207804,
       214.24797512, 217.23161353, 219.63035683, 221.89358596,
       221.19803234, 222.50923988])
```

In [98]:
```
# 7. Create a dataframe with Actual and Predicted values

final = pd.DataFrame( {'Actual': Y_test, 'Predict' : y_pred } )
final
```

Out[98]:

Date	Actual	Predict
2024-12-20	254.367035	249.126514
2024-12-23	257.286652	252.258954
2024-12-24	258.103729	253.105874
2024-12-26	254.685883	255.748660
2024-12-27	251.307877	256.645179
...	...	...
2025-03-24	223.203659	217.231614
2025-03-25	220.989075	219.630357
2025-03-26	223.303421	221.893586
2025-03-27	217.367935	221.198032
2025-03-28	221.587616	222.509240

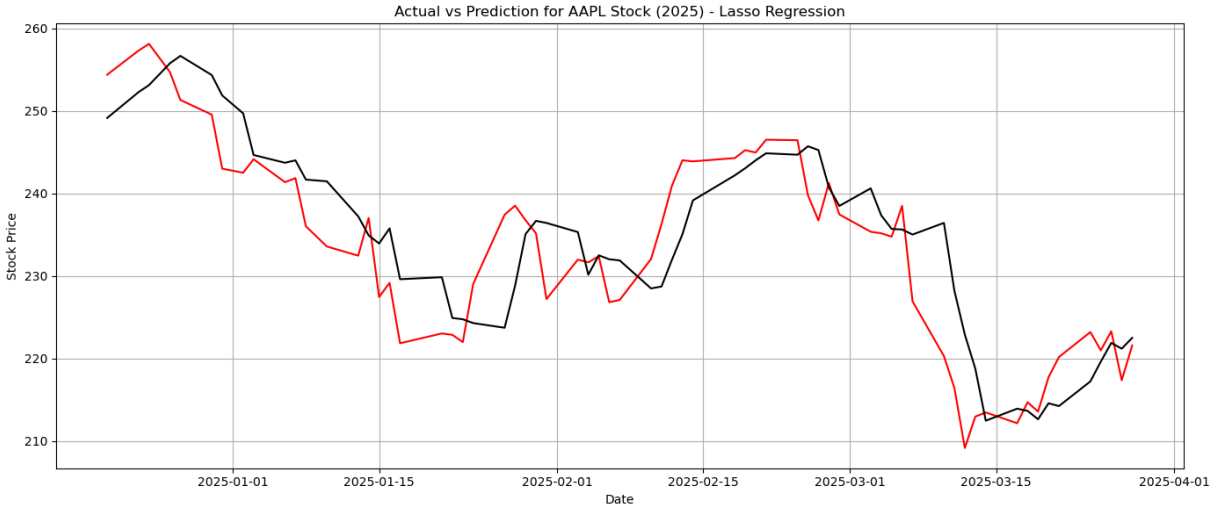
66 rows × 2 columns

In [104…
```
# 8. Plot the graph between Actual and Predicted Prices

import matplotlib.pyplot as plt

plt.figure(figsize = (14,6))
plt.plot(final.index, final['Actual'], label = 'Actual', color = 'red')
```

```
plt.plot(final.index, final['Predict'], label = 'Predicted', color = 'black')
plt.title('Actual vs Prediction for AAPL Stock (2025) - Lasso Regression')
plt.xlabel("Date")
plt.ylabel("Stock Price")
plt.grid(True)
plt.tight_layout()
plt.show()
```



In [102…

```
# 9. Evaluate the model - R Square, Mse, RMSE

r2 = r2_score(Y_test, y_pred)
print('R^2', r2)

mse = mean_squared_error(Y_test, y_pred)
print('MSE', mse)

RMSE = np.sqrt(mse)
print('RMSE', RMSE)
```

```
R^2 0.7561788861150982
MSE 34.320898526222734
RMSE 5.858404093797451
```

In [ ]: