Experiment 4: Implement programs to check stationarity of a time series data

Aim:

The goal of this experiment is to write a python program to check the stationarity of the time series dataset.

1. Importing Required Libraries

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from statsmodels.tsa.stattools import adfuller
```

Explanation:
We import numpy (np) is used for numerical operations, pandas (pd) for data manipulation, matplotlib.pyplot (plt) for plotting, and seaborn (sns) for statistical data visualization.

2. Loading the Dataset

```
data = pd.read_csv('/content/gold (1).csv', parse_dates=True, index_col=0)
data.head()
```

Explanation:
We use `pd.read_csv()` to load a CSV file containing Gold data.

3. Displaying the First Few Rows

```
df.head()
```

Explanation:
`df.head()` shows the first five rows of the dataset, giving us an overview of the available columns and their values.

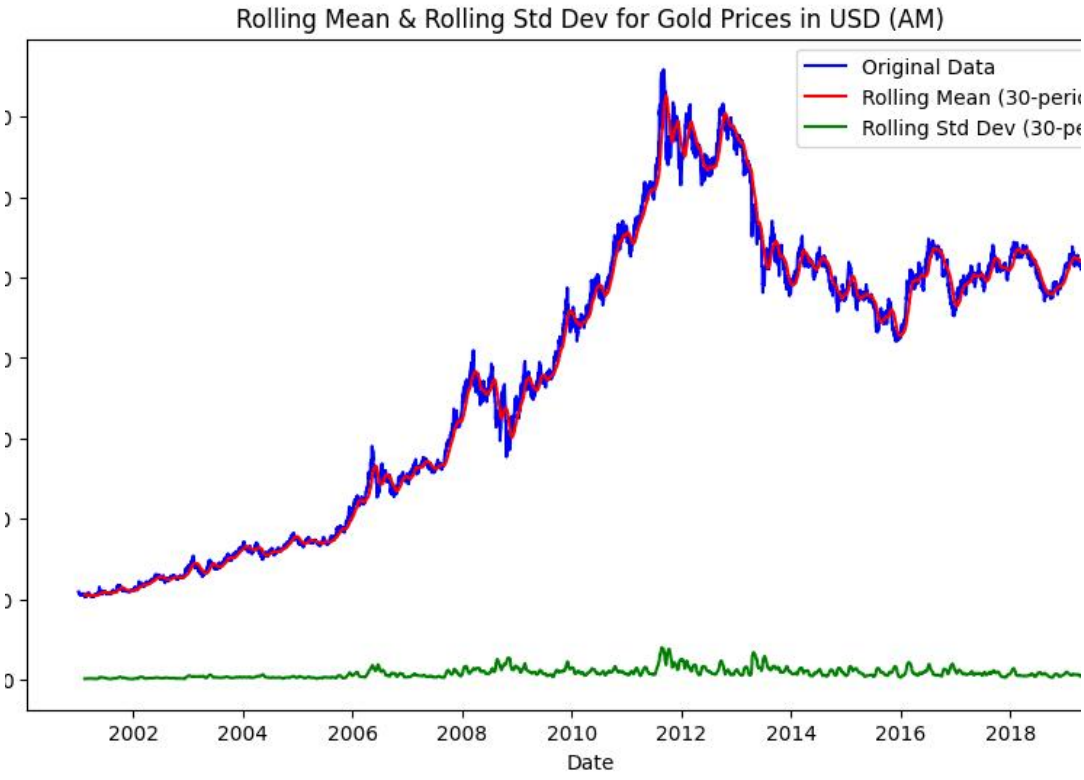
4. calculating rolling mean and rolling standard deviation

```
rolling_mean = data['USD (AM)'].rolling(window=30).mean()
rolling_std = data['USD (AM)'].rolling(window=30).std()
plt.plot(data['USD (AM)'], label='Original Data', color='blue')
plt.plot(rolling_mean, label='Rolling Mean (30-period)', color='red')
plt.plot(rolling_std, label='Rolling Std Dev (30-period)', color='green')
```

```
plt.title('Rolling Mean & Rolling Std Dev for Gold Prices in USD (AM)')
plt.xlabel('Date')
plt.ylabel('Gold Price (USD)')
plt.legend(loc='best')
```

5. Visualization

```
plt.show()
```



6. ADF test:

```
adf_result = adfuller(data['USD (AM)'].dropna())
print("ADF Statistic:", adf_result[0])
print("p-value:", adf_result[1])
if adf_result[1] < 0.05:
    print("The time series is likely stationary (Reject null hypothesis).")
else:
    print("The time series is likely non-stationary (Fail to reject null hypothesis).")
```

7. Output:

ADF Statistic: -1.0653629752531542

p-value: 0.7286853153924067

The time series is likely non-stationary (Fail to reject null hypothesis)

8.Result:

Thus the program to check the stationarity of the time series data has been completed successfully.