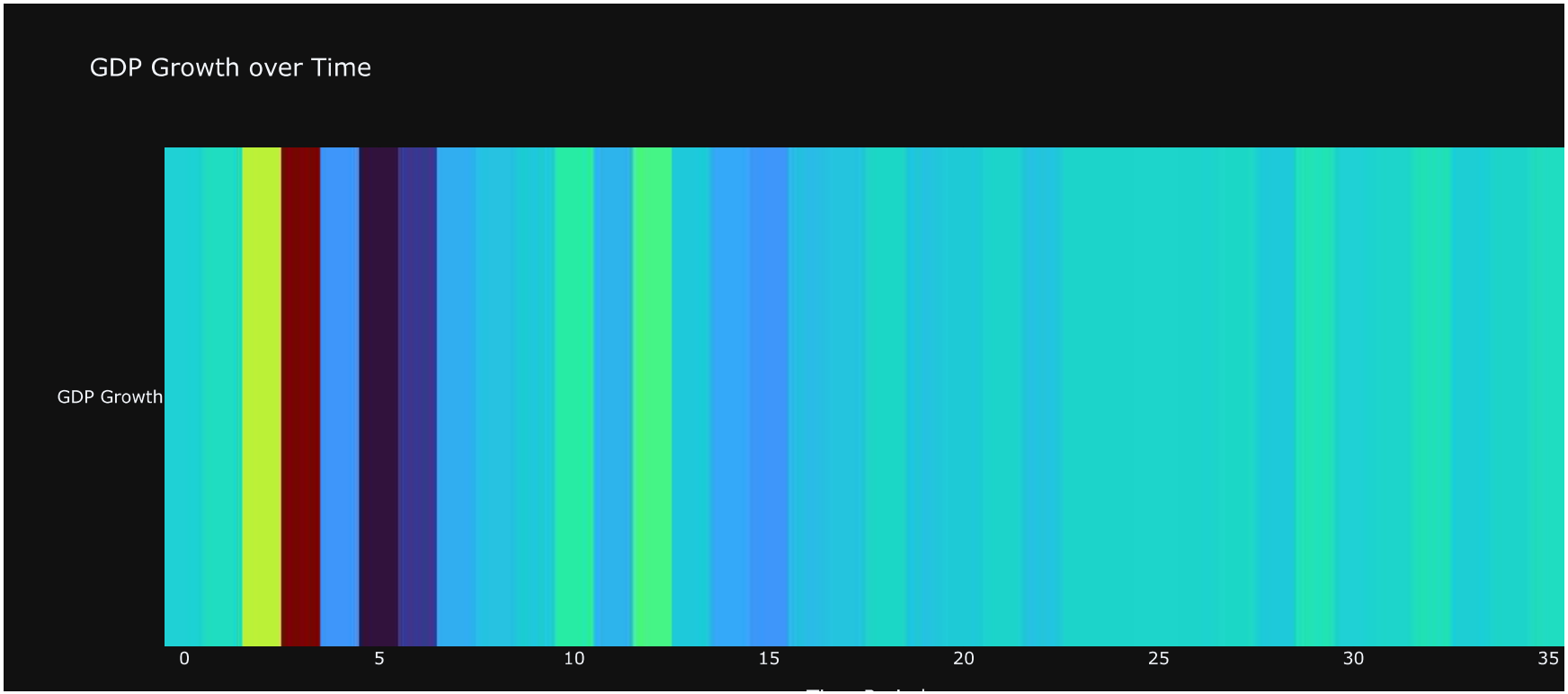
In [1]:
```
# For the  Recession analysis, Lets starts by importing the necessary Python libraries and the dataset:
import pandas as pd
import plotly.graph_objs as go
import plotly.express as px
import plotly.io as pio
pio.templates.default = "plotly_dark"
UK_gdp_data = pd.read_csv(r'C:\Users\OKONKWO HENRY\Downloads\UK_monthly_gdp.csv')
print(UK_gdp_data.head())
```

```
  Time Period  GDP Growth
0    /01/2020         0.3
1    /02/2020        -0.5
2    /03/2020        -7.0
3    /04/2020       -20.9
4    /05/2020         3.2
```

In [2]:
```
# Let’s have a look at the descriptive statistics of the dataset:
print(UK_gdp_data.describe())
```

```
       GDP Growth
count   36.000000
mean     0.072222
std      4.392631
min    -20.900000
25%     -0.200000
50%      0.300000
75%      1.025000
max      9.000000
```

In [3]:
```
# The GDP growth over time:
fig = go.Figure()
fig.add_trace(go.Heatmap(
                   z=[UK_gdp_data['GDP Growth']],
                   x=UK_gdp_data.index,
                   y=['GDP Growth'],
                   colorscale='Turbo_r'))

fig.update_layout(title='GDP Growth over Time',
                  xaxis_title='Time Period',
                  yaxis_title='')

fig.show()
```

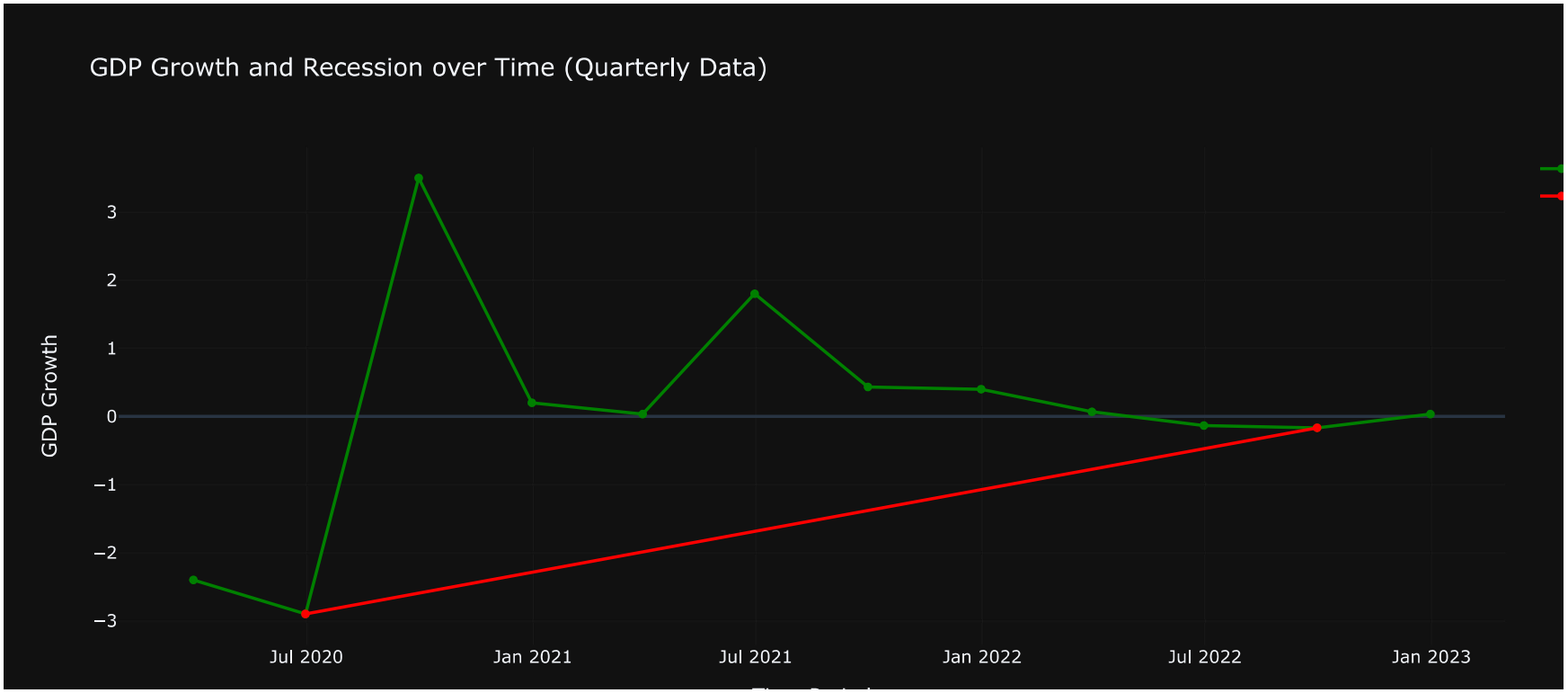


In [4]:
```
# Convert monthly data to quarterly data using resample method

UK_gdp_data['Time Period'] = pd.to_datetime(UK_gdp_data['Time Period'], format='/%m/%Y')
UK_gdp_data.set_index('Time Period', inplace=True)
quarterly_data = UK_gdp_data.resample('Q').mean()
print(quarterly_data.head())
```

```
             GDP Growth
Time Period
2020-03-31    -2.400000
2020-06-30    -2.900000
2020-09-30     3.500000
2020-12-31     0.200000
2021-03-31     0.033333
```

In [5]:
```
# Calculate and analyze recession based on quarterly GDP growth:
# Calculate recession based on quarterly GDP growth
quarterly_data['Recession'] = ((quarterly_data['GDP Growth'] < 0) & (quarterly_data['GDP Growth'].shift(1) < 0))

# Fill missing values with False (since the first quarter cannot be in a recession)
quarterly_data['Recession'].fillna(False, inplace=True)

# Plot the GDP growth and recession data
```

```
fig = go.Figure()
fig.add_trace(go.Scatter(x=quarterly_data.index,
                         y=quarterly_data['GDP Growth'],
                         name='GDP Growth',
                         line=dict(color='green', width=2)))
fig.add_trace(go.Scatter(x=quarterly_data[quarterly_data['Recession']].index,
                         y=quarterly_data[quarterly_data['Recession']]['GDP Growth'],
                         name='Recession', line=dict(color='red', width=2)))

fig.update_layout(title='GDP Growth and Recession over Time (Quarterly Data)',
                  xaxis_title='Time Period',
                  yaxis_title='GDP Growth')

fig.show()
```

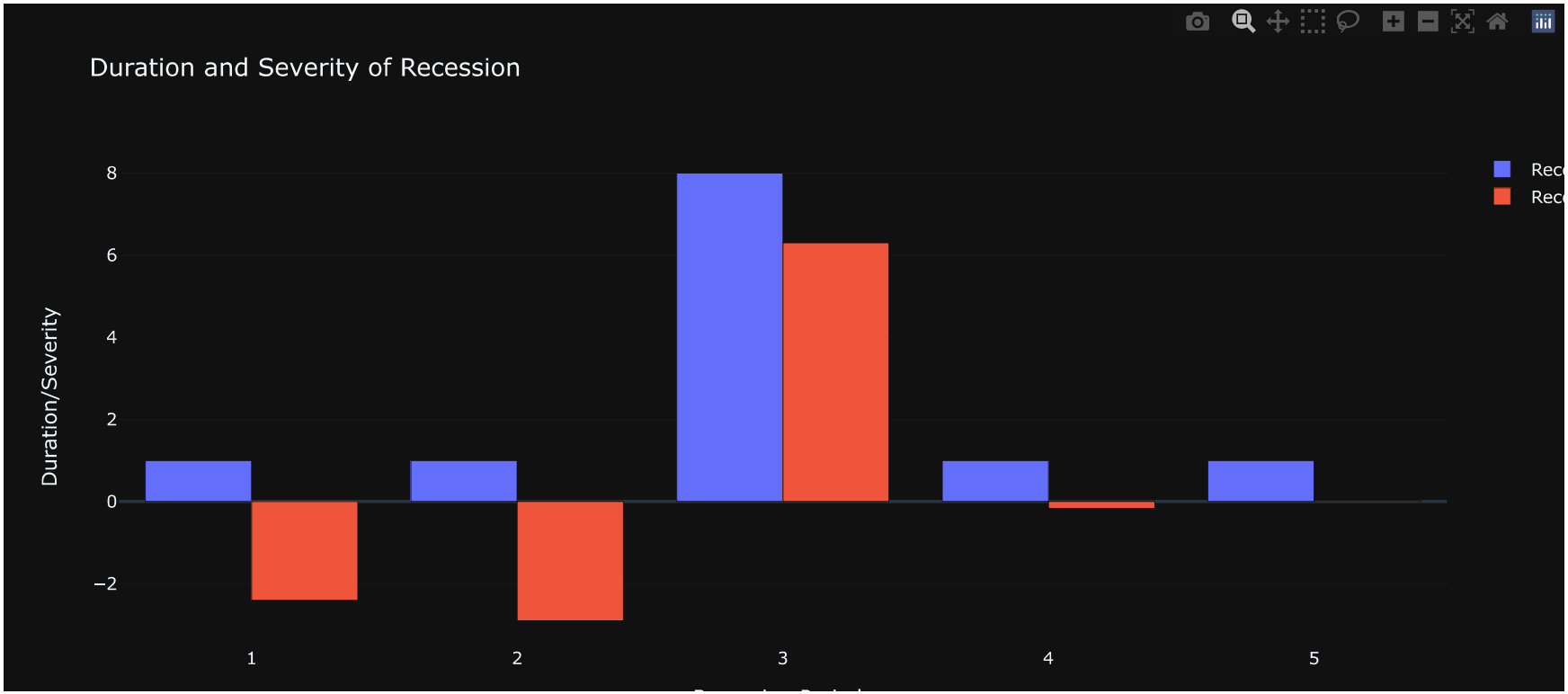


In [6]:
```
# DATA INSIGHT
#The red line shows the periods of negative GDP growth (considered recessions),
# and the green line shows the overall trend in GDP growth over time.
```

In [7]:
```
# Analyze the severity of the recession.
quarterly_data['Recession Start'] = quarterly_data['Recession'].ne(quarterly_data['Recession'].shift()).cumsum()
print(quarterly_data.head())
recession_periods = quarterly_data.groupby('Recession Start')
```

```
print (recession_periods)
recession_duration = recession_periods.size()
print (recession_duration)
recession_severity = recession_periods['GDP Growth'].sum()
print (recession_severity)

fig = go.Figure()
fig.add_trace(go.Bar(x=recession_duration.index, y=recession_duration,
                     name='Recession Duration'))
fig.add_trace(go.Bar(x=recession_severity.index, y=recession_severity,
                     name='Recession Severity'))

fig.update_layout(title='Duration and Severity of Recession',
                  xaxis_title='Recession Periods',
                  yaxis_title='Duration/Severity')

fig.show()
```

```
            GDP Growth  Recession  Recession Start
Time Period
2020-03-31    -2.400000      False                1
2020-06-30    -2.900000       True                2
2020-09-30     3.500000      False                3
2020-12-31     0.200000      False                3
2021-03-31     0.033333      False                3
<pandas.core.groupby.generic.DataFrameGroupBy object at 0x0000028D7E6881F0>
Recession Start
1    1
2    1
3    8
4    1
5    1
dtype: int64
Recession Start
1   -2.400000
2   -2.900000
3    6.300000
4   -0.166667
5    0.033333
Name: GDP Growth, dtype: float64
```


Duration and Severity of Recession
Duration/Severity
8
6
4
2
0
−2
1
2
3
4
5

In [ ]: