# decomposition

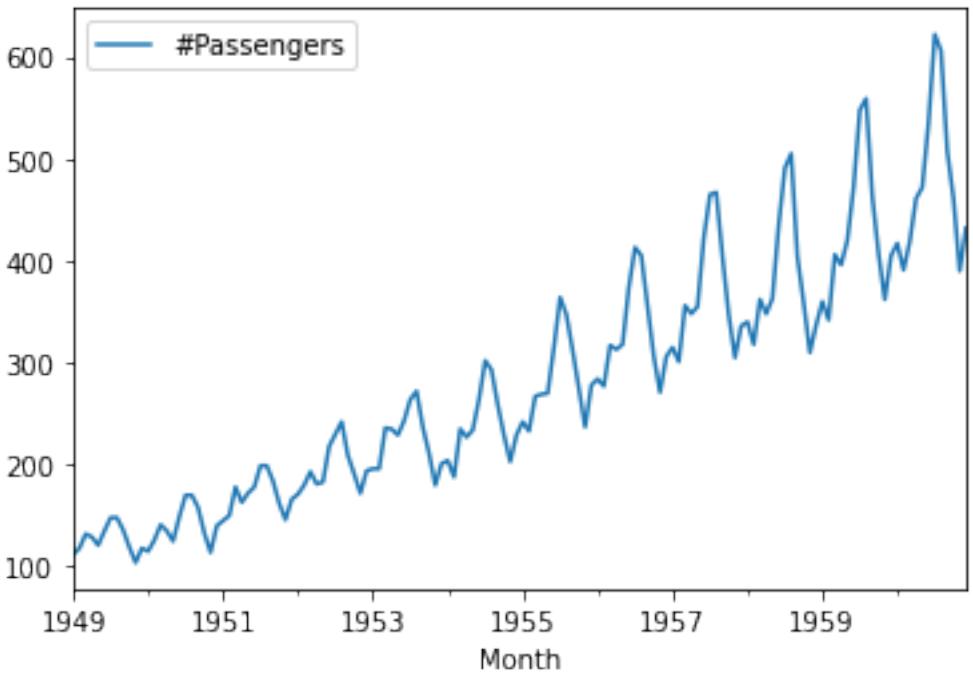
August 19, 2022

[1]:
```
import pandas as pd
import numpy as np
from matplotlib import pyplot
from statsmodels.tsa.seasonal import seasonal_decompose

%matplotlib inline

df = pd.read_csv('AirPassengers.csv')
df
```

[1]:
```
        Month  #Passengers
0     1949-01          112
1     1949-02          118
2     1949-03          132
3     1949-04          129
4     1949-05          121
..        …            …
139   1960-08          606
140   1960-09          508
141   1960-10          461
142   1960-11          390
143   1960-12          432

[144 rows x 2 columns]
```

[2]:
```
df.set_index('Month',inplace=True)
df.index=pd.to_datetime(df.index)
#drop null values
df.dropna(inplace=True)
df.plot()
```

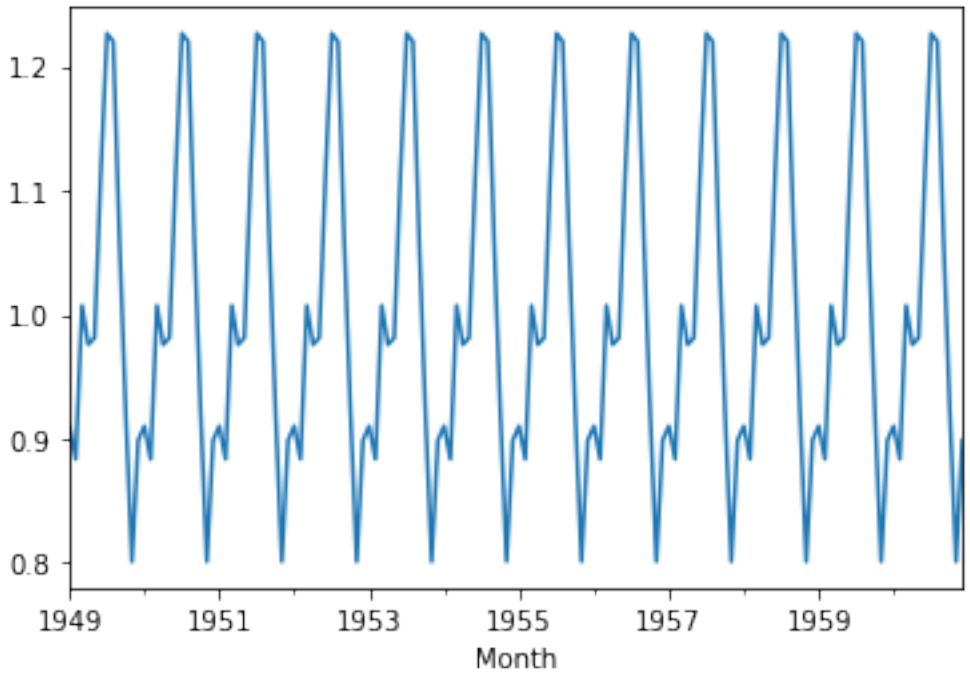
[2]:
```
<AxesSubplot:xlabel='Month'>
```




[6]:
```
result=seasonal_decompose(df['#Passengers'], model='multiplicable')
```

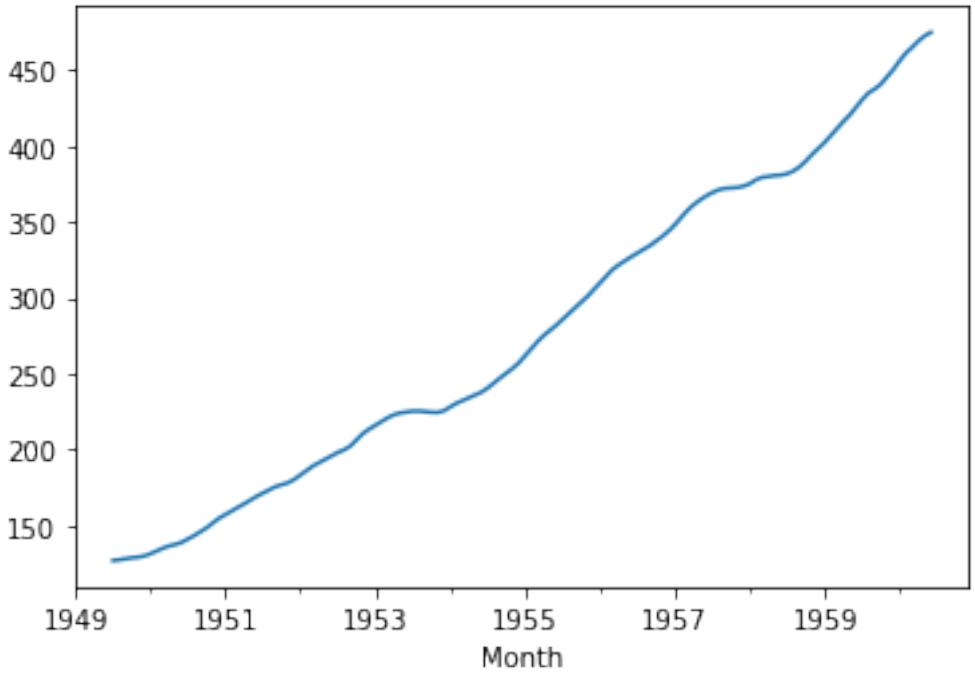
[7]:
```
result.seasonal.plot()
```

[7]: <AxesSubplot:xlabel='Month'>



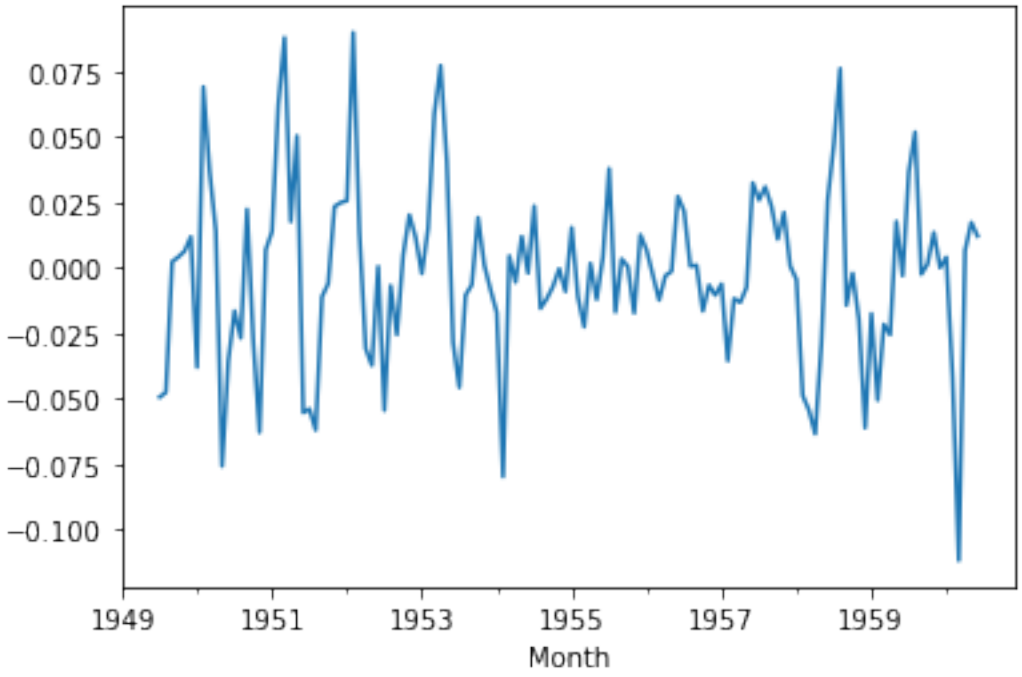
[8]:
```
result.trend.plot()
```

[8]: <AxesSubplot:xlabel='Month'>




[9]:
```
np.log(result.resid).plot()
```

[9]: <AxesSubplot:xlabel='Month'>


0.075
0.050
0.025
0.000
−0.025
−0.050
−0.075
−0.100
1949
1951
1953
1955
1957
1959
Month

[ ]: