

```
In [1]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
```

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

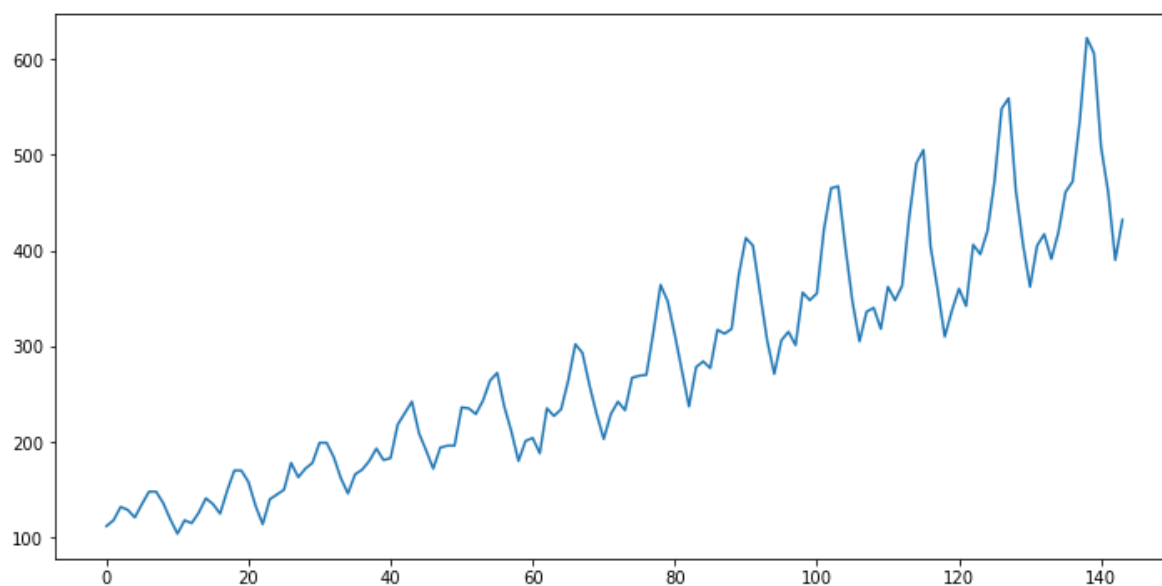
```
In [3]: df.head(10)
```

Out[3]:

	Month	#Passengers
0	1949-01	112
1	1949-02	118
2	1949-03	132
3	1949-04	129
4	1949-05	121
5	1949-06	135
6	1949-07	148
7	1949-08	148
8	1949-09	136
9	1949-10	119

```
In [4]: plt.rcParams.update({'figure.figsize':(12,6)})
df['#Passengers'].plot()
```

Out[4]: <AxesSubplot:>



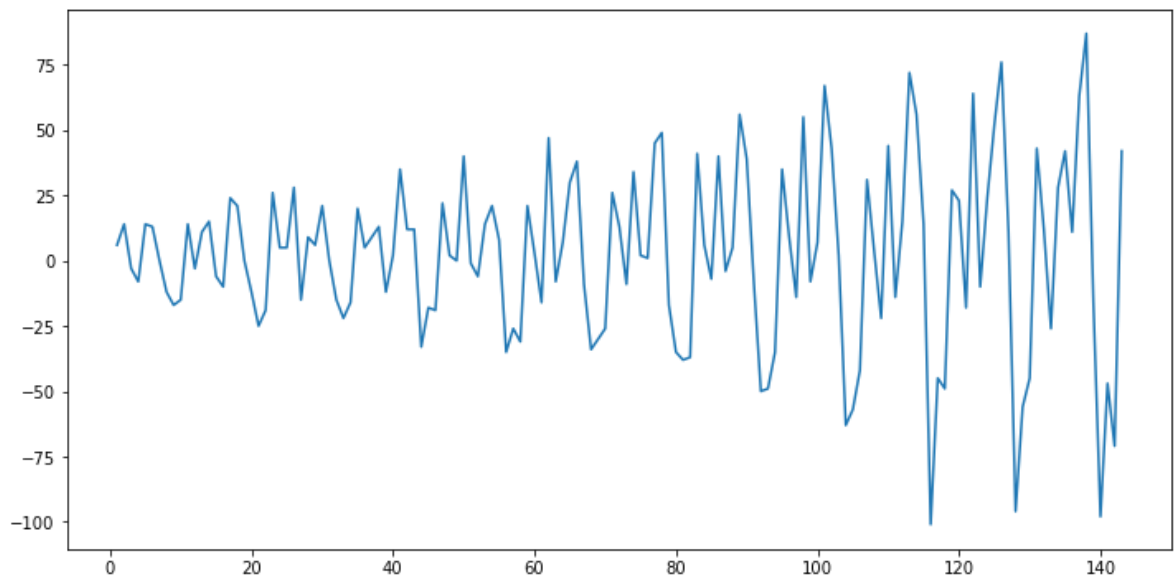
In []:

Method1 - Differencing and Seasonal differencing

```
In [5]: df['#Passengers_diff'] = df['#Passengers'] - df['#Passengers'].shift(1)
```

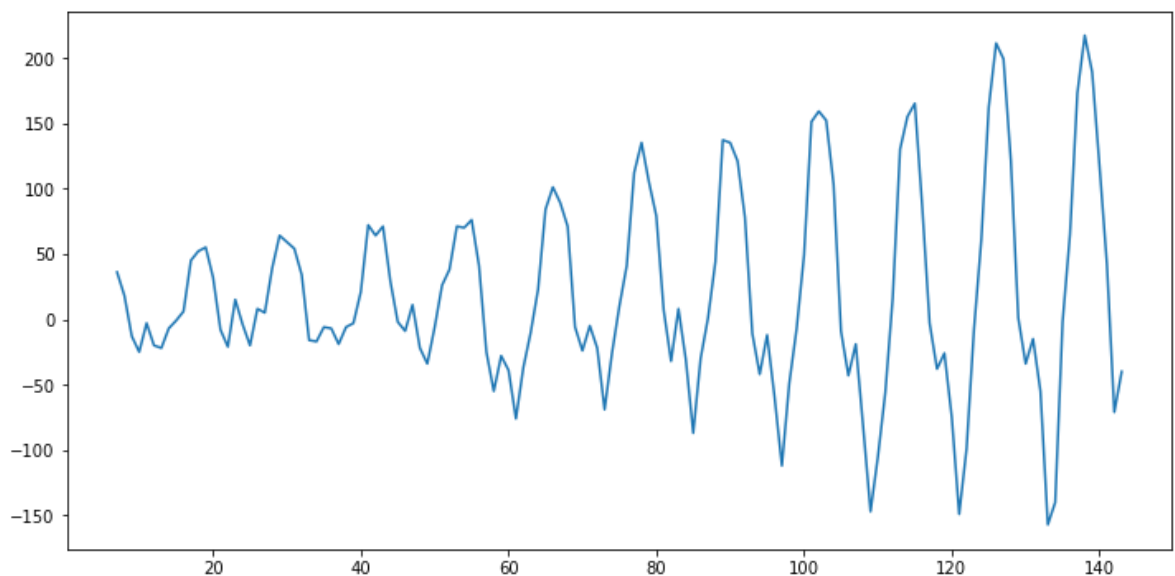
```
In [6]: df['#Passengers_diff'].dropna().plot()
```

```
Out[6]: <AxesSubplot:>
```



```
In [7]: df['#Passengers_diff_7'] = df['#Passengers'] - df['#Passengers'].shift(7)
df['#Passengers_diff_7'].dropna().plot()
```

```
Out[7]: <AxesSubplot:>
```

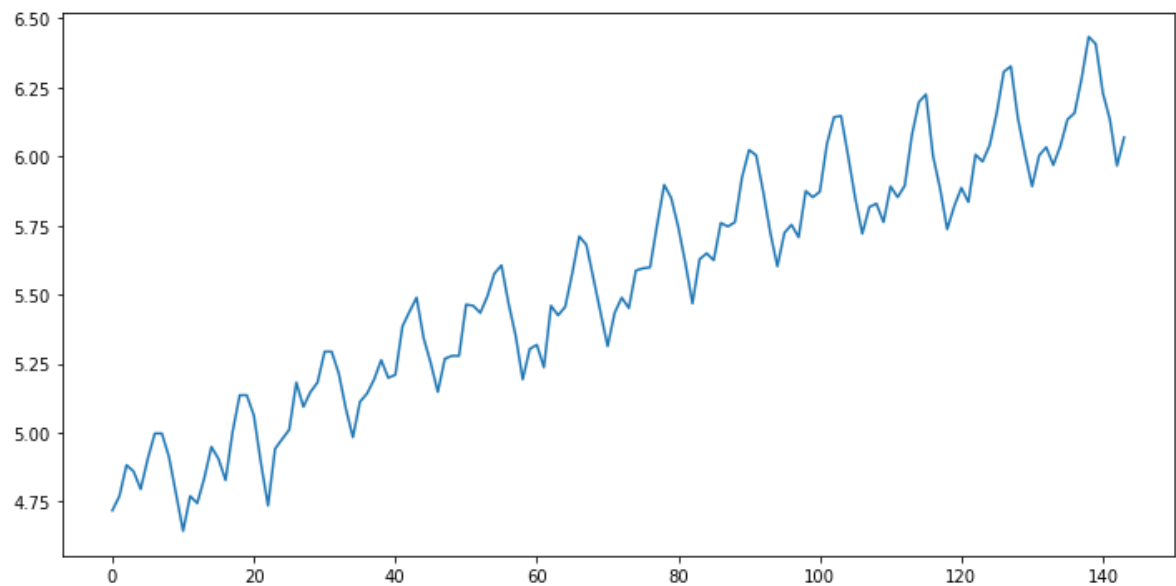


Transformation

```
In [8]: # calculate the log
df['adj_log'] = np.log(df['#Passengers'])
# calculate the square root
df['adj_sqrt'] = np.sqrt(df['#Passengers'])
# calculate the cubed root
df['adj_cbrt'] = np.cbrt(df['#Passengers'])
```

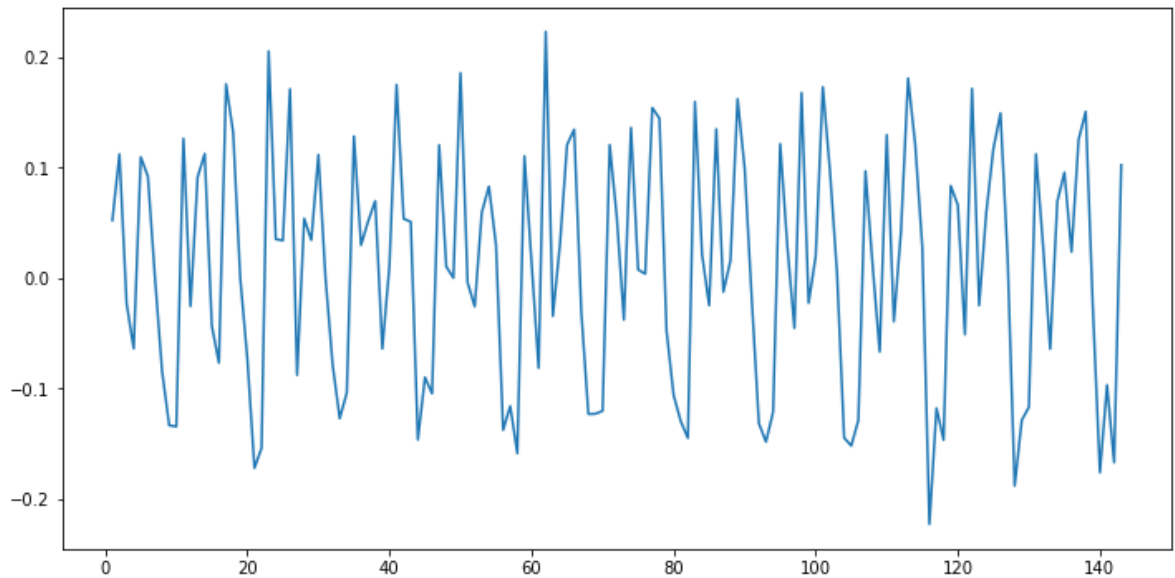
```
In [12]: df['adj_log'].dropna().plot()
```

Out[12]: <AxesSubplot:>



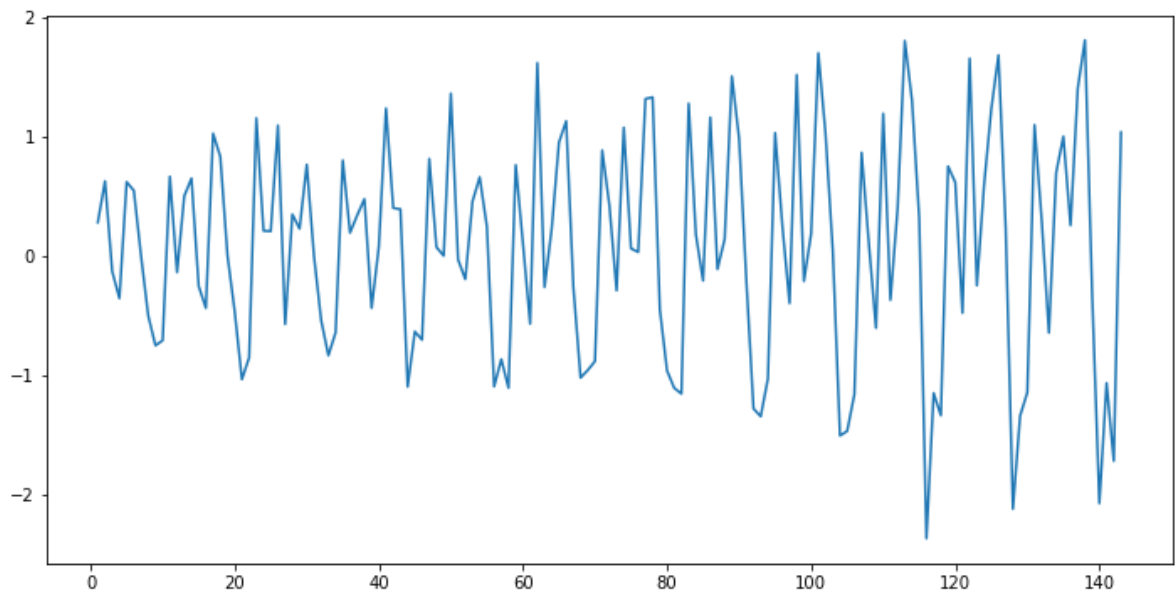
```
In [18]: df['#Passengers_log_diff'] = df['adj_log'] - df['adj_log'].shift(1)
df['#Passengers_log_diff'].dropna().plot()
```

Out[18]: <AxesSubplot:>



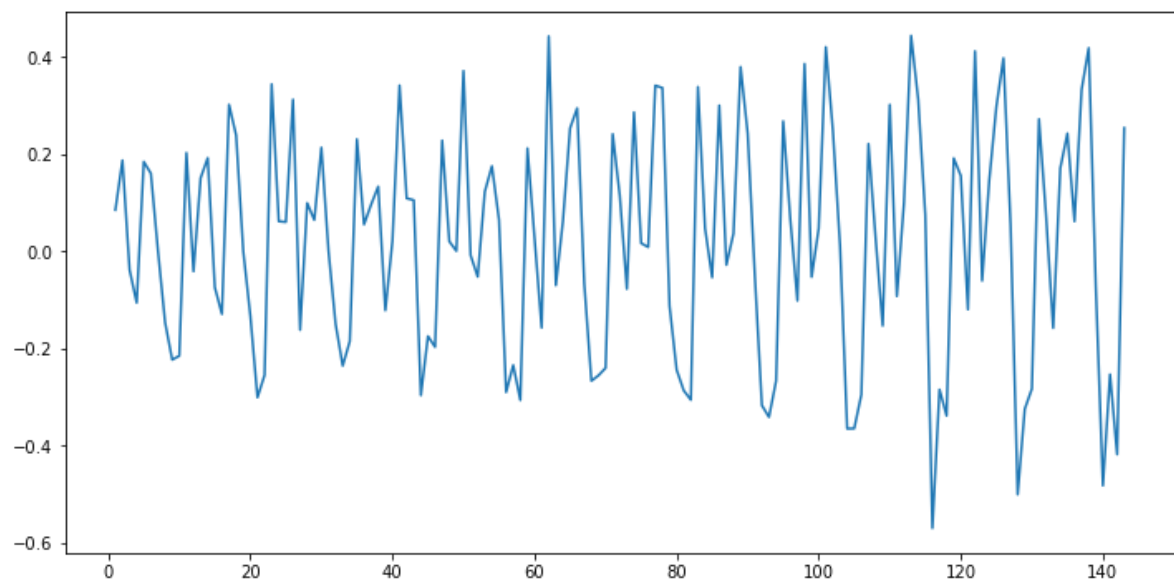
```
In [17]: df['#Passengers_sqrt_diff'] = df['adj_sqrt'] - df['adj_sqrt'].shift(1)
df['#Passengers_sqrt_diff'].dropna().plot()
```

Out[17]: <AxesSubplot:>



```
In [16]: df['#Passengers_cbrt_diff'] = df['adj_cbrt'] - df['adj_cbrt'].shift(1)
df['#Passengers_cbrt_diff'].dropna().plot()
```

Out[16]: <AxesSubplot:>



In []: