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

In [2]:
```python
data=pd.read_csv("datasets/AirPassengers.csv")
data.head()
```
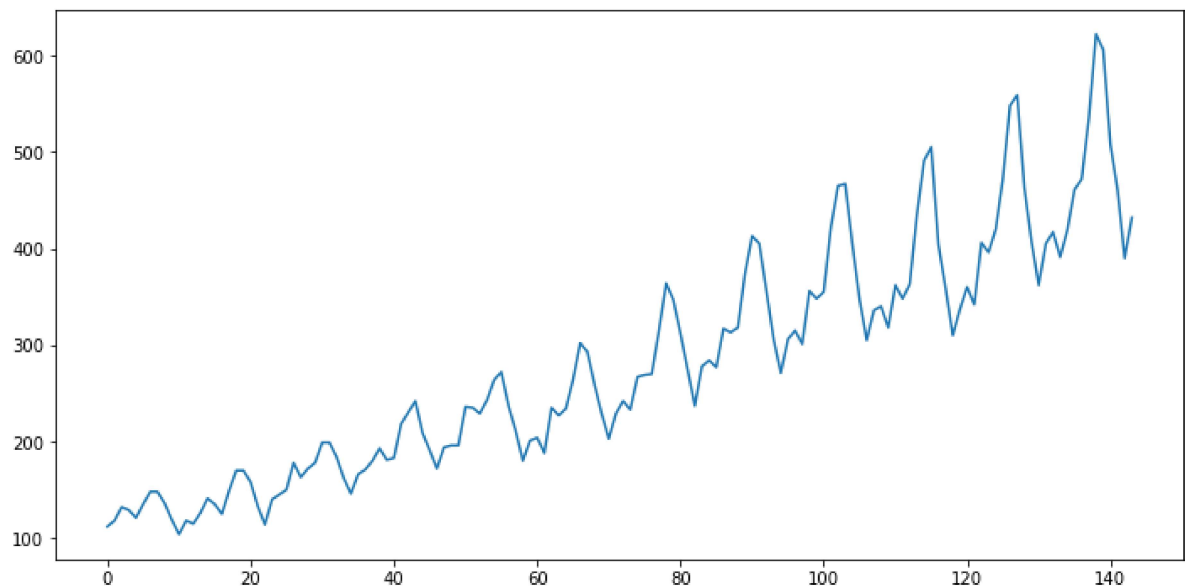
Out[2]:

	Month	#Passengers
0	1949-01	112
1	1949-02	118
2	1949-03	132
3	1949-04	129
4	1949-05	121

In [3]:
```python
plt.rcParams.update({'figure.figsize':(12,6)})
data['#Passengers'].plot()
```
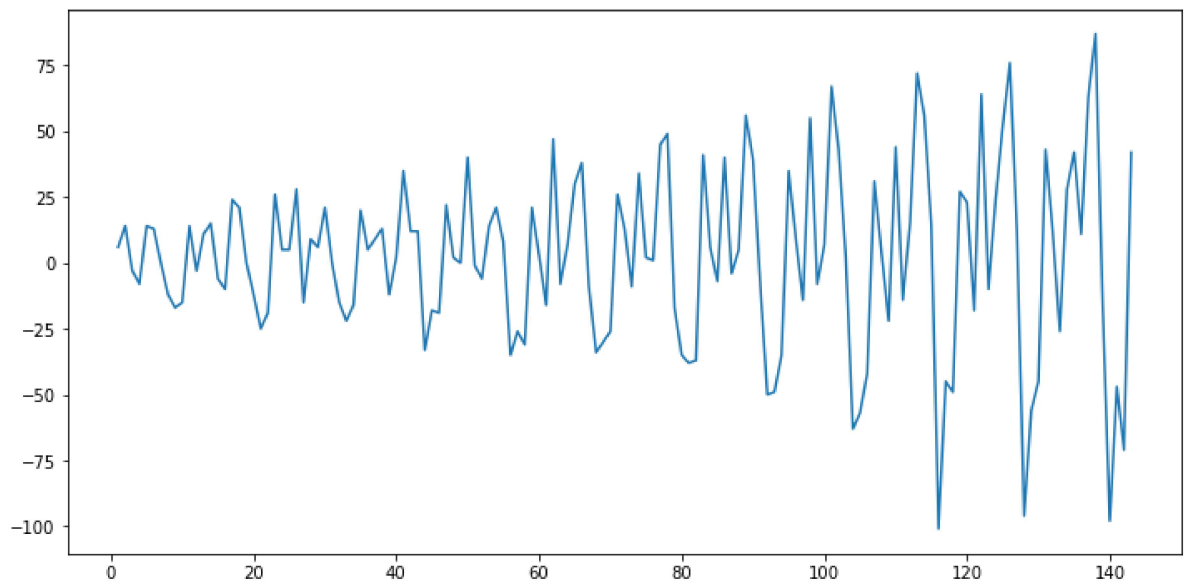
Out[3]: <AxesSubplot:>

Method 1-Differencing and Seasonal differencing

In [4]:
```python
#Differencing meaning y(t) = y(t)-y(t-1)
```

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

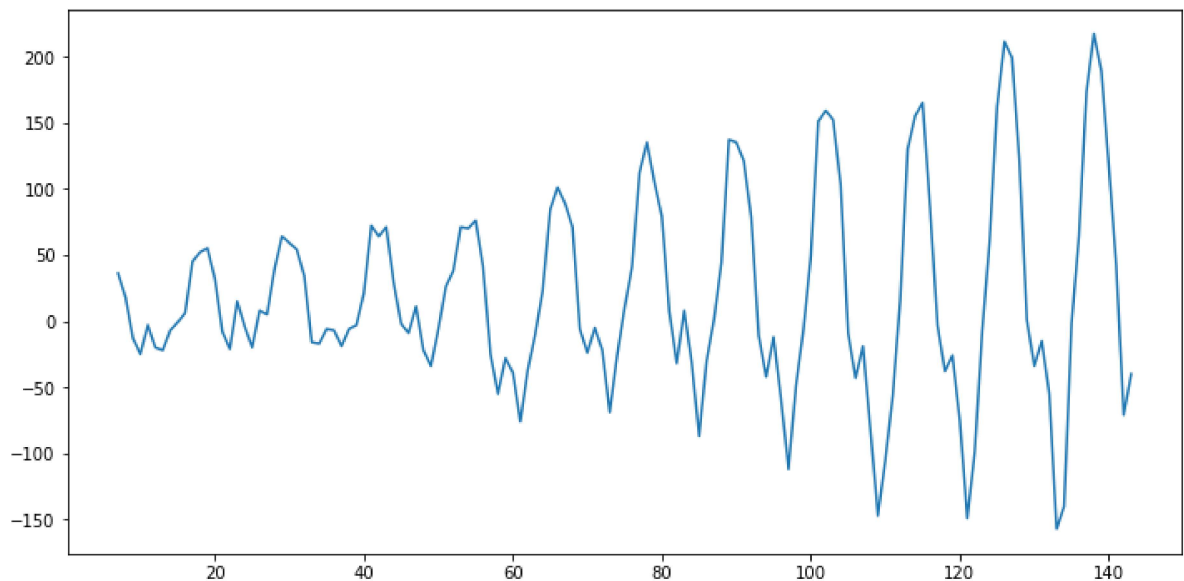In [6]:
```python
data['#Passengers_diff'].dropna().plot()
```

Out[6]: <AxesSubplot:>

In [10]:
```python
# Seasonal Differencing meaning y(t) = y(t)-y(t-n)
```

In [11]:
```python
data['#Passengers_diff'] = data['#Passengers'] - data['#Passengers'].shift(7)
data['#Passengers_diff'].dropna().plot()
```

Out[11]: <AxesSubplot:>

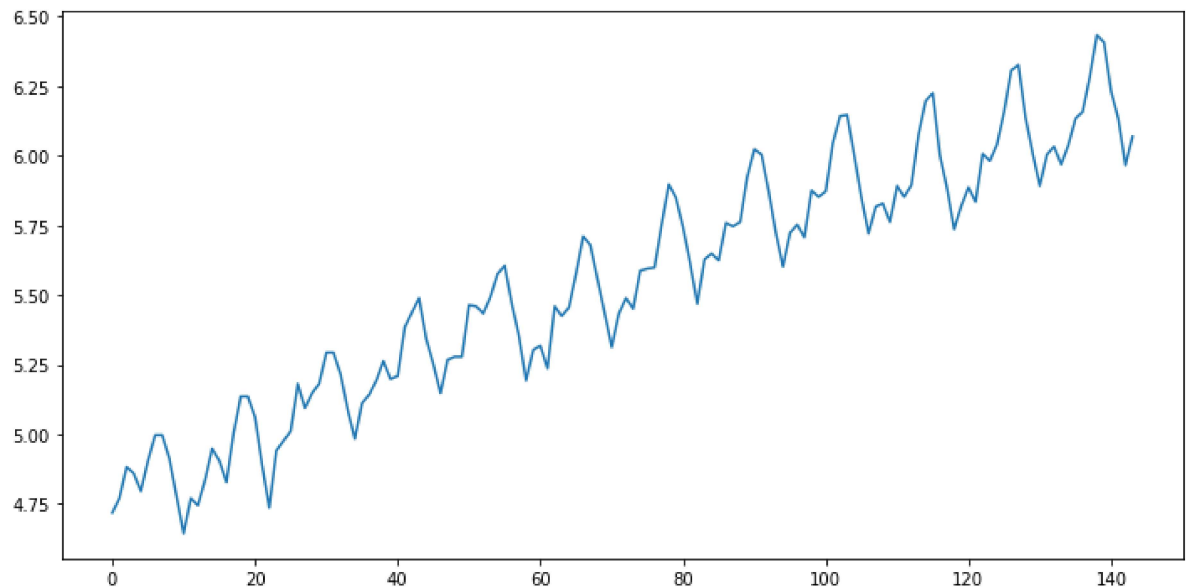# Method 2 - Transformation

```python
In [13]:  #Create transformation columns
          import numpy as np

          #Calculate the log
          data['adj_log']=np.log(data['#Passengers'])
          #Calculate the square root
          data['adj_sqrt']=np.sqrt(data['#Passengers'])
          #Calculate the cube root
          data['adj_cbrt']=np.cbrt(data['#Passengers'])
```
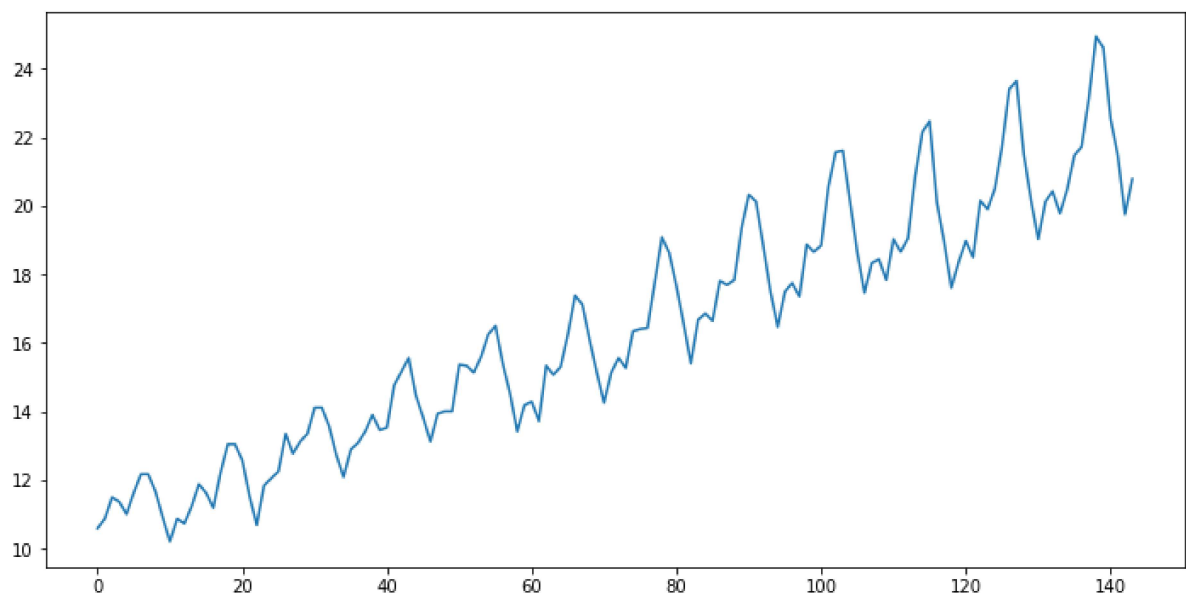
```python
In [14]:  data['adj_log'].dropna().plot()
```
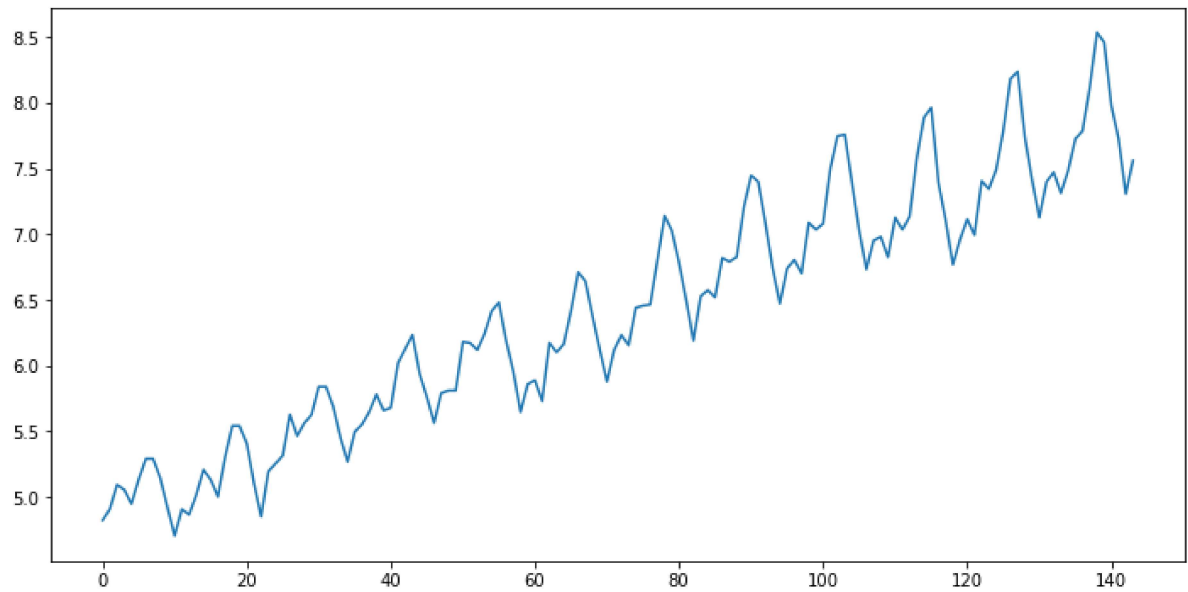
Out[14]: <AxesSubplot:>


```python
In [15]:  data['adj_sqrt'].dropna().plot()
```
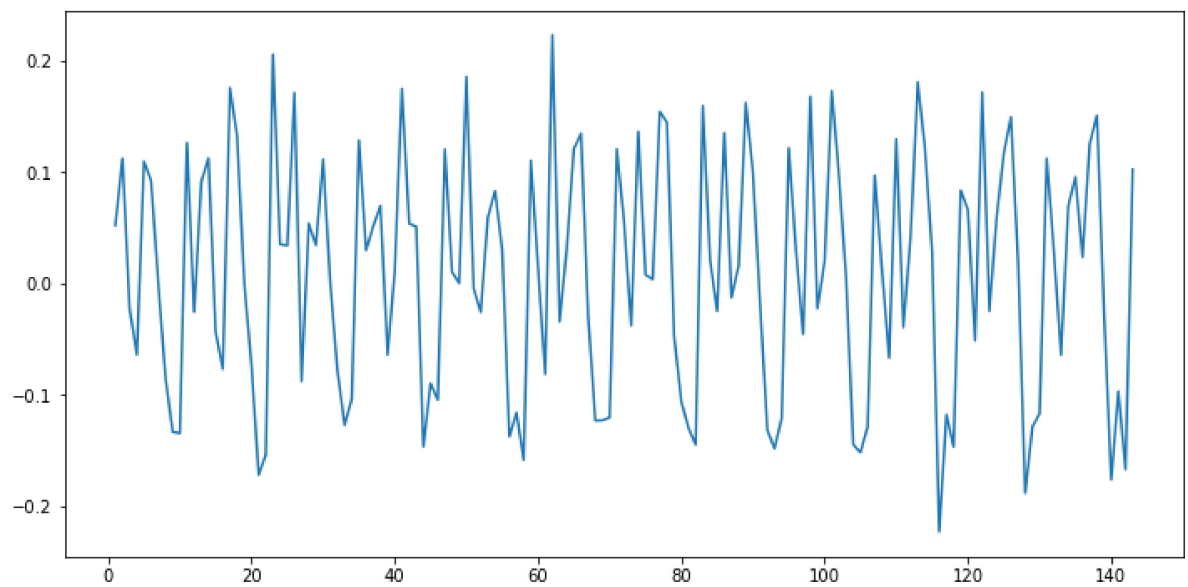
Out[15]: <AxesSubplot:>

In [16]:
```python
data['adj_cbrt'].dropna().plot()
```
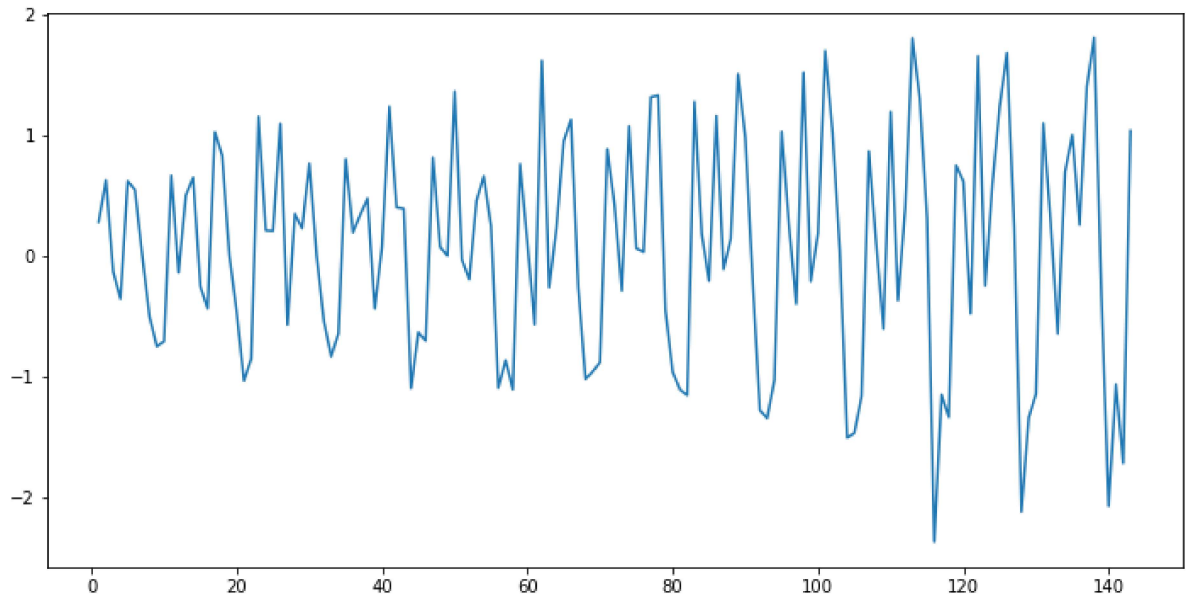
Out[16]: <AxesSubplot:>

In [20]:
```python
data['#Passengers_log_diff'] = data['adj_log'] - data['adj_log'].shift(1)
data['#Passengers_log_diff'].dropna().plot()
```
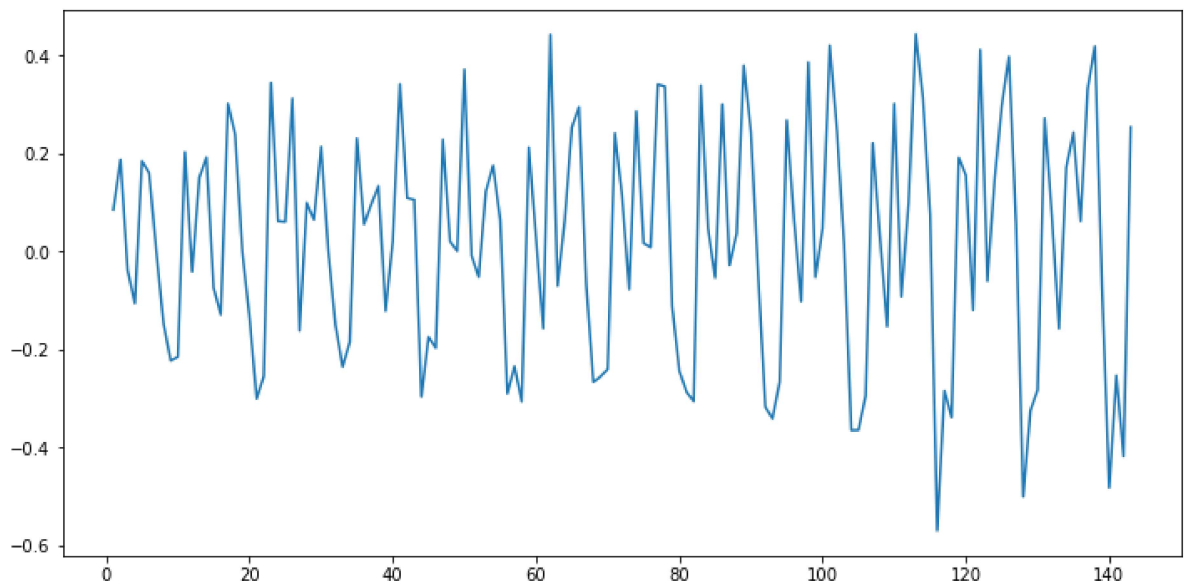
Out[20]: <AxesSubplot:>

In [21]:
```python
data['#Passengers_sqrt_diff'] = data['adj_sqrt'] - data['adj_sqrt'].shift(1)
data['#Passengers_sqrt_diff'].dropna().plot()
```

Out[21]: <AxesSubplot:>

In [22]:
```python
data['#Passengers_cbrt_diff'] = data['adj_cbrt'] - data['adj_cbrt'].shift(1)
data['#Passengers_cbrt_diff'].dropna().plot()
```

Out[22]: <AxesSubplot:>

In [ ]: