In [3]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [4]:
```
from statsmodels.tsa.stattools import acf, pacf
from statsmodels.graphics.tsaplots import plot_acf, plot_pacf
from pandas.plotting import lag_plot
```

In [5]:
```
df1=pd.read_csv('airline_passengers.csv',index_col='Month',parse_da
```

In [6]:
```
df1
```

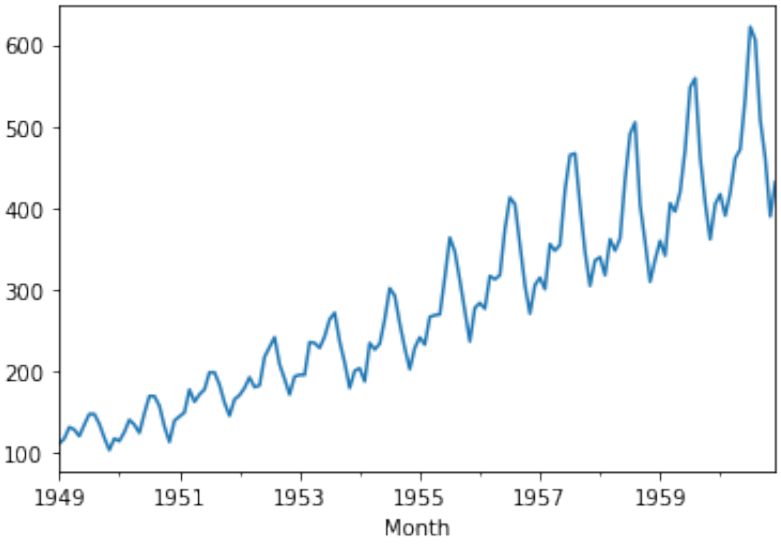
Out[6]:

Month	Thousands of Passengers
1949-01-01	112
1949-02-01	118
1949-03-01	132
1949-04-01	129
1949-05-01	121
...	...
1960-08-01	606
1960-09-01	508
1960-10-01	461
1960-11-01	390
1960-12-01	432

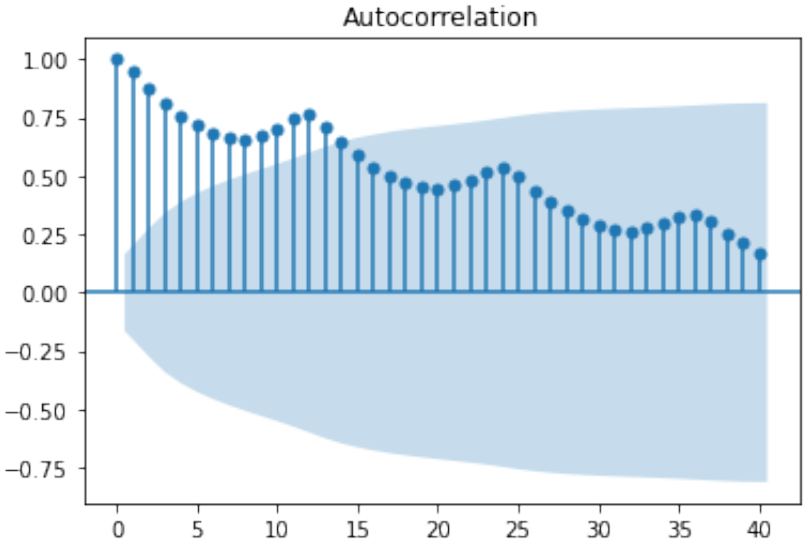
144 rows × 1 columns

In [7]:
```
df1['Thousands of Passengers'].plot()
```

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



In [8]:
```
plot_acf(df1['Thousands of Passengers'],lags=40);
```



In [9]:
```
df1['dif1']=df1['Thousands of Passengers'].diff()
df1
```

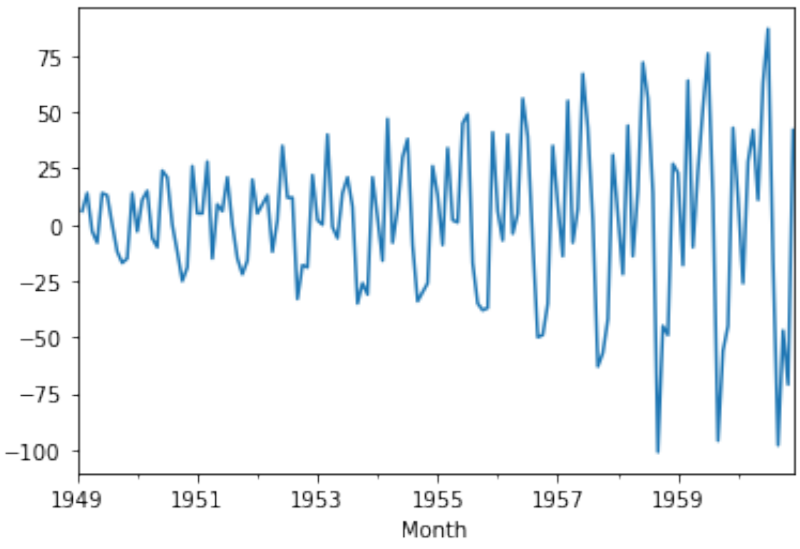
Out[9]:

Month	Thousands of Passengers	dif1
1949-01-01	112	NaN
1949-02-01	118	6.0
1949-03-01	132	14.0
1949-04-01	129	-3.0
1949-05-01	121	-8.0
...	...	...
1960-08-01	606	-16.0
1960-09-01	508	-98.0
1960-10-01	461	-47.0
1960-11-01	390	-71.0
1960-12-01	432	42.0

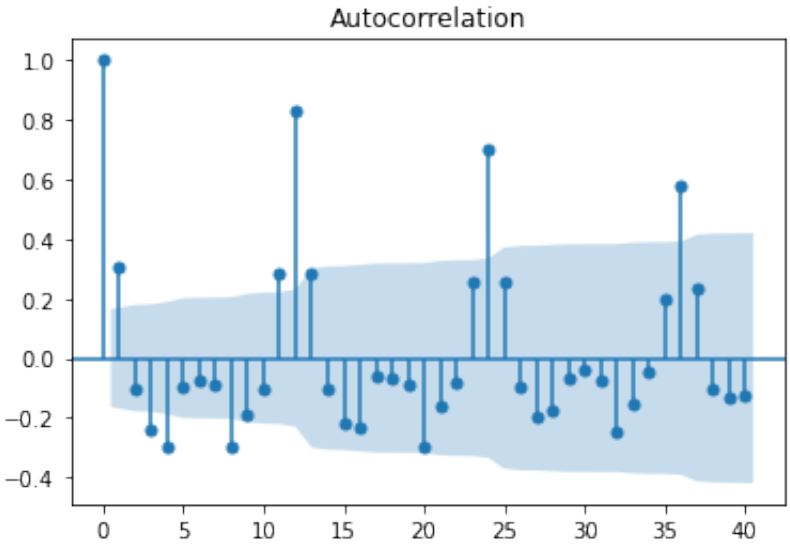
144 rows × 2 columns

In [10]:
```
df1['dif1'].plot()
```

Out[10]: <AxesSubplot:xlabel='Month'>



In [11]:
```
plot_acf(df1['dif1'].dropna(),lags=40);
```



In [12]:
```
df1['dif1_12']=df1['dif1'].diff(12)
df1
```

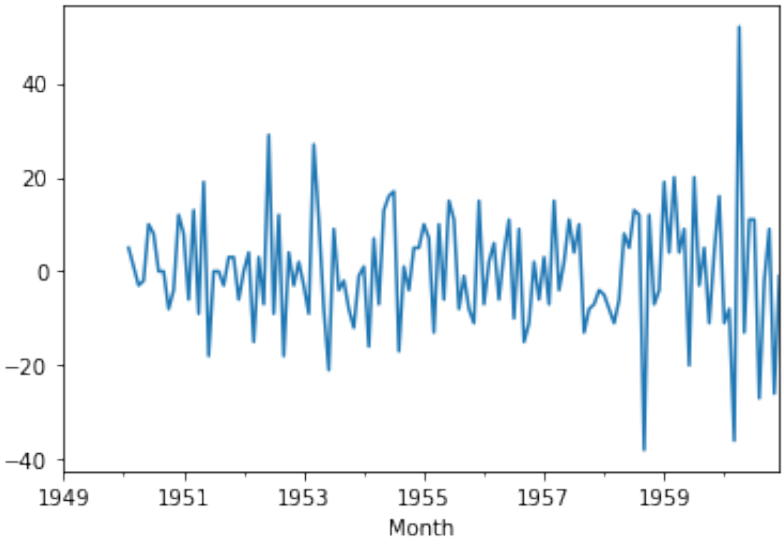
Out[12]:

Month	Thousands of Passengers	dif1	dif1_12
1949-01-01	112	NaN	NaN
1949-02-01	118	6.0	NaN
1949-03-01	132	14.0	NaN
1949-04-01	129	-3.0	NaN
1949-05-01	121	-8.0	NaN
...	...	...	...
1960-08-01	606	-16.0	-27.0
1960-09-01	508	-98.0	-2.0
1960-10-01	461	-47.0	9.0
1960-11-01	390	-71.0	-26.0
1960-12-01	432	42.0	-1.0

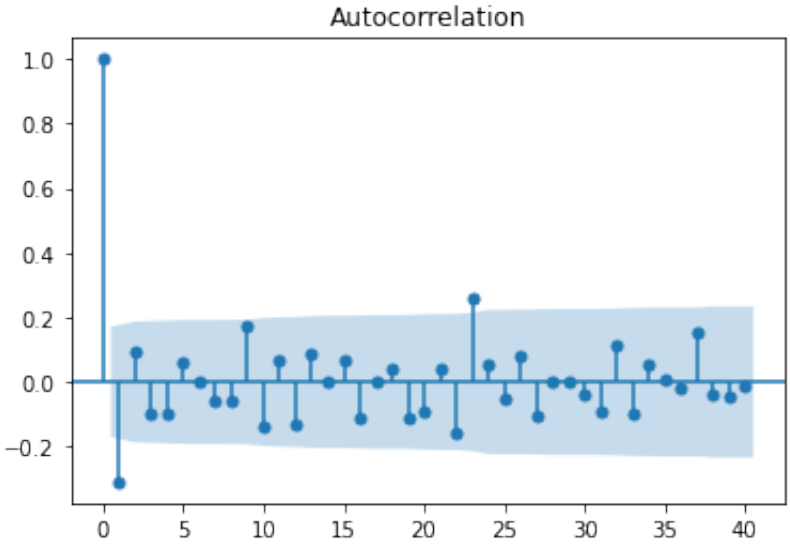
144 rows × 3 columns

In [13]:
```
df1['dif1_12'].plot()
```

Out[13]: <AxesSubplot:xlabel='Month'>



In [14]:
```
plot_acf(df1['dif1_12'].dropna(),lags=40);
```



In [ ]:
```

```