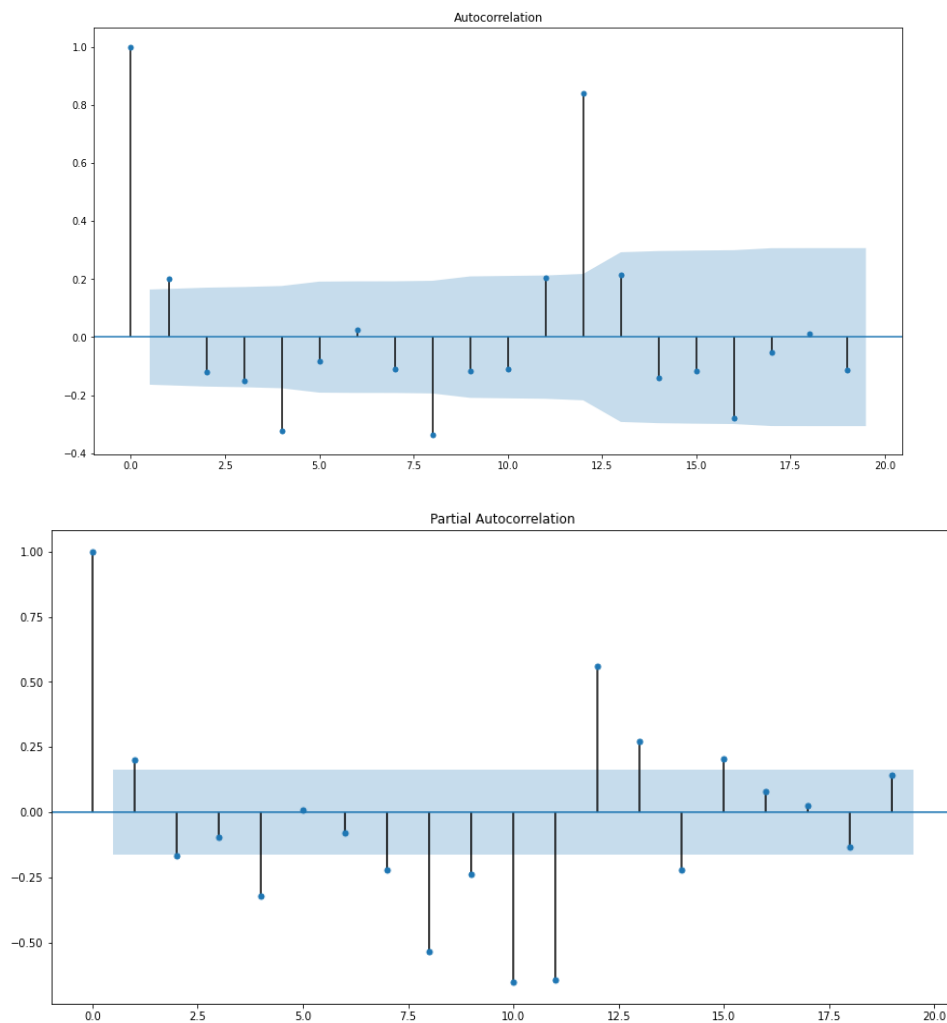# Lesson 4: Time Series Forecasting Using Stochastic Models

```python
from statsmodels.tsa.stattools import acf, pacf
from statsmodels.graphics.tsaplots import plot_acf, plot_pacf
#ACF
plot_acf(df_diff, lags = range(0, 20))
plt.show()
#PACF
plot_pacf(df_diff, lags = range(0, 20))
plt.show()
```



```
#The shaded regions in the plots are the confidence intervals. The lags where the PACF #and
ACF charts cross this region are the values for p and q respectively. In both plots, #p=q=1.

#The shaded regions in the plots are the confidence intervals. The lags where the PACF and
#ACF charts cross this region are the values for p and q respectively.
#In the ACF plot, there is one lag that crosses the significance level hence, q=1. Similarly
#in the PACF plot, p=2
```
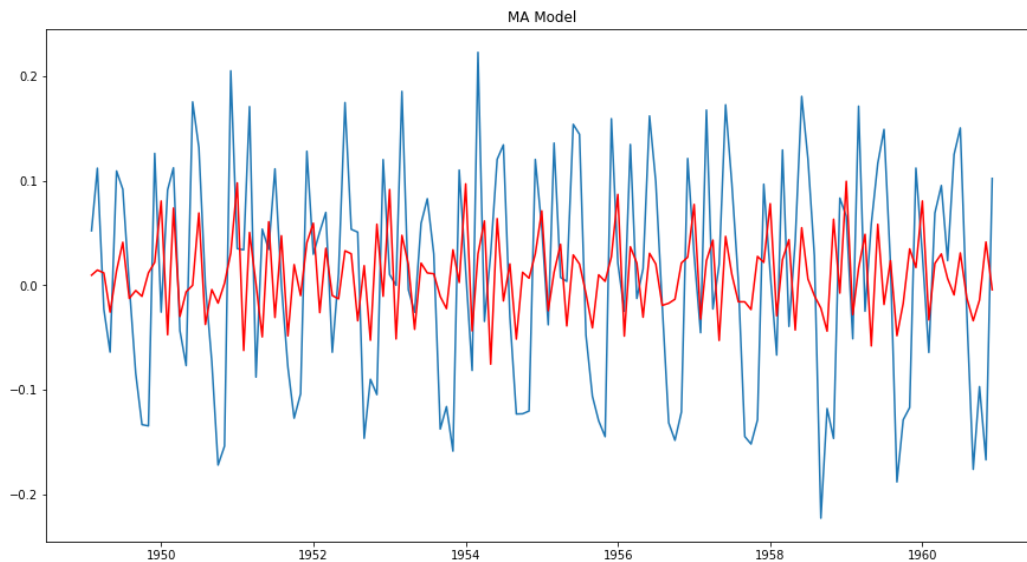
```python
from statsmodels.tsa.arima_model import ARIMA
#(p,d,q)
AR_model = ARIMA(df_diff, order=(2,0,0))
AR_model_results = AR_model.fit()
plt.plot(df_diff)
plt.plot(AR_model_results.fittedvalues, color='red')
```


AR Model
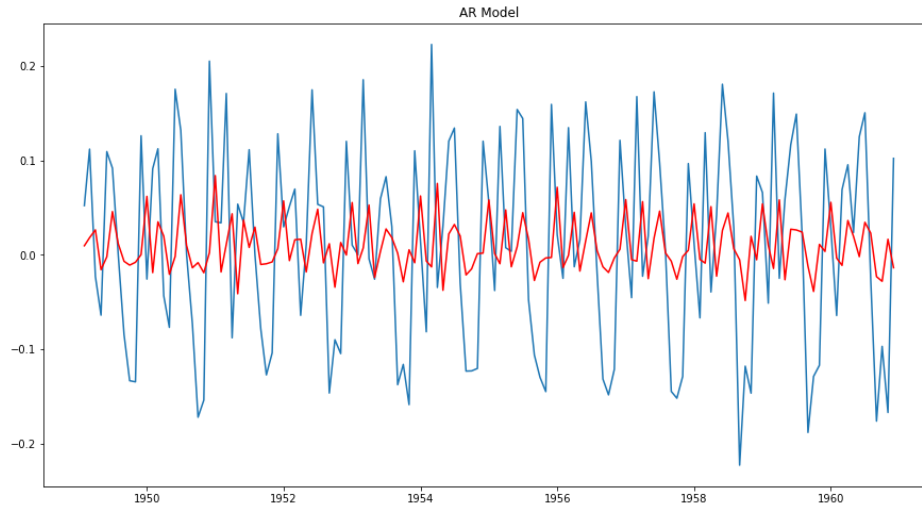
```python
MA_model = ARIMA(df_diff, order=(0,0,2))
MA_model_results = MA_model.fit()
plt.plot(df_diff)
plt.plot(MA_model_results.fittedvalues, color='red')
```


MA Model

```python
ARIMA_model = ARIMA(df_diff, order=(2,0,1))
```

```
ARIMA_results = ARIMA_model.fit()
plt.plot(df_diff)
plt.plot(ARIMA_results.fittedvalues, color='red')
```