***Auto Regressive Process***



For the ACF we multiply with the AR equation then take expectation.

is the characteristic polynomial of the process and its roots determine whether the process is stationary or not?

Non-stationary series will have non declining effect. This is an undesirable property.

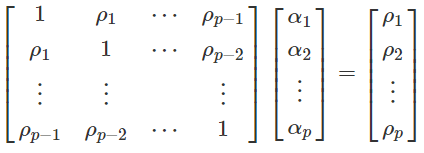
**Theorem**: if , is stationary process iff the modulus of the roots of the characteristic polynomial are greater than one. The reciprocal roots of the characteristic polynomial should be less than 1.

Some reciprocal roots can be real and some can be complex.

results in the weights that decay exponentially in time and also guarantees stationarity. This is the condition for stationarity for AR1 Process.

, and are the conditions for stationary for AR2 process.

***Partial auto correlation matrix for AR-p process.***



***Moving average process***

ACF is very helpful in identifying the MA model and its appropriate order as it cut off after lag q. In reality sample ACF will not necessarily be equal to zero after lag q. It is expected to become very small absolute value after lag q. For a data set of N observations, this is often tested against limits.

For the first order moving average process the auto correlation is bounded by 1/2 and auto correlation function cuts off after lag 1. For the second order moving average process the auto covariances for the lag 1 and lag2 are as follows;