

# The ARIMA Model

## Full Name:

The **A**utoregressive **I**ntegrated **M**oving **A**verage Model

## Mathematical Notation:

**ARIMA (1, 1, 1)**  $\Delta P_t = c + \varphi_1 \Delta P_{t-1} + \theta_1 \varepsilon_{t-1} + \varepsilon_t$

$P_t, P_{t-1}$	Values in the current period and 1 period ago respectively
$\varepsilon_t, \varepsilon_{t-1}$	Error terms for the same two periods
$c$	Baseline constant factor
$\varphi_1$	What part of the value last period is relevant in explaining the current one
$\theta_1$	What part of the error last period is relevant in explaining the current value
$\Delta P_t$	$= P_t - P_{t-1}$

365 DataScience

## Description:

The ARIMA is just an integrated version of the ARMA model. What that means is, we simply integrate the data (however many times is needed) to get a stationary set.

Then, we fit a normal ARMA model like we already learned to.

An ARIMA model with 0 degrees of integration is simply an ARMA model, and so any ARIMA (p, 0, q) model is equivalent to an ARMA (p,q).

The order of Integration (d) tells us exactly how many times we need to compute the non-seasonal differences between the values to reach stationarity and including more is discouraged (due to data attrition and interpretability of the results).

# The ARIMA Model

## Implementation of the Simple Model in Python:

The library the  
*ARIMA* method  
comes from

The method we  
are importing

```
from statsmodels.tsa.arima_model import ARIMA
```

```
model_ar_1_i_1_ma_1 = ARIMA(df.market_value, order=(1,1,1))
```

The variable storing the  
model characteristics  
that we will fit later

The time we  
wish to analyse

The order of the model

\*For an ARIMA(p,d,q) model,  
simply change the order from  
(1,1,1) to (p,d,q).