7. ARMA Model

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A time series $\{X_t\}_{t\geq 1}$ is a **moving average autoregressive process** of orders p, q, denoted by **ARMA** (p, q) , if it is a sum of an **AR** (p) component with an **MA** (q) component:

$$\begin{aligned} X_t &= \phi_1 X_{t-1} + \phi_2 X_{t-2} + \cdots + \phi_p X_{t-p} \\ &+ W_t + \theta_1 W_{t-1} + \theta_2 W_{t-2} + \cdots + \theta_q W_{t-q} \end{aligned}$$

A time series $\{X_t\}_{t\geq 1}$ is an **ARIMA** (p, d, q) model if the difference of order d, $\{\nabla^d X_t\}_{t\geq 1}$, is an **ARMA** (p, q) model.

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