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SARIMAX

Auto Regressive $AR(q)$:

$$\boxed{X_t = \phi_1 \cdot X_{(t-1)} + \phi_2 \cdot X_{(t-2)} + ... + \phi_q \cdot X_{(t-q)} + Z_t}$$

Moving Average $MA(p)$:

$$\boxed{X_t = \theta_1 \cdot Z_{(t-1)} + \theta_2 \cdot Z_{(t-2)} + ... + \theta_p \cdot Z_{(t-p)} + Z_t}$$

ARMA(p, q):

$$\boxed{X_t = [\theta_1 \cdot Z_{(t-1)} + \theta_2 \cdot Z_{(t-2)} + ... + \theta_p \cdot Z_{(t-p)}] + [\phi_1 \cdot X_{(t-1)} + \phi_2 \cdot X_{(t-2)} + ... + \phi_q \cdot X_{(t-q)}] + Z_t}$$

ARIMA(p, d, q):

Its the same of ARMA but defining:

$$\boxed{y_t^* = X_t - X_{(t-d)}}$$

and then apply ARMA to y_t^*.

ARIMAX(p, d, q):

Its the same of ARIMA but first we do a regression in function of endogen and exogen variables and apply ARIMA to the residuals of this regression.

SARIMAX$(p, d, q), (s, P, D, Q)$:

Its the same of ARIMAX but separating the stationary component.
