Last Class

1) Quizzes - Recap
2) Auto Correlation
3) Partial Auto Correlation
4) Correlation vs Causation
5) ARIMA family
   - Auto Regression (AR)
   - Moving Averages (MA)
   - ARMA (AR + MA)
   - ~~ARIMA~~
   - ~~SARIMA~~

Today's class

1) Quick recap
2) ARIMA
3) SARIMA
4) Data preprocessing and confidence intervals
5) Exogenous variables
6) SARIMAX Model

AR(p) $\quad$ AR(p = 2)

$$\hat{y}_t = \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + c$$

AR(4) $\quad \hat{y}_t = \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \alpha_3 y_{t-3} + \alpha_4 y_{t-4} + c$

AR(P = 2)

$$\hat{y}_t = \alpha'_1 y_{t-s} + \alpha'_2 y_{t-2s} + c'$$

$\boxed{s = 12}$

MA(Q = 3)

$$\hat{y}_t = \beta'_1 y_{t-s} + \beta'_2 y_{t-2s} + \beta'_3 y_{t-3s} + K'$$

Trending

diff() $\rightarrow$ order 1

$$y'_t = y_t - y_{t-1}$$

Seasonality

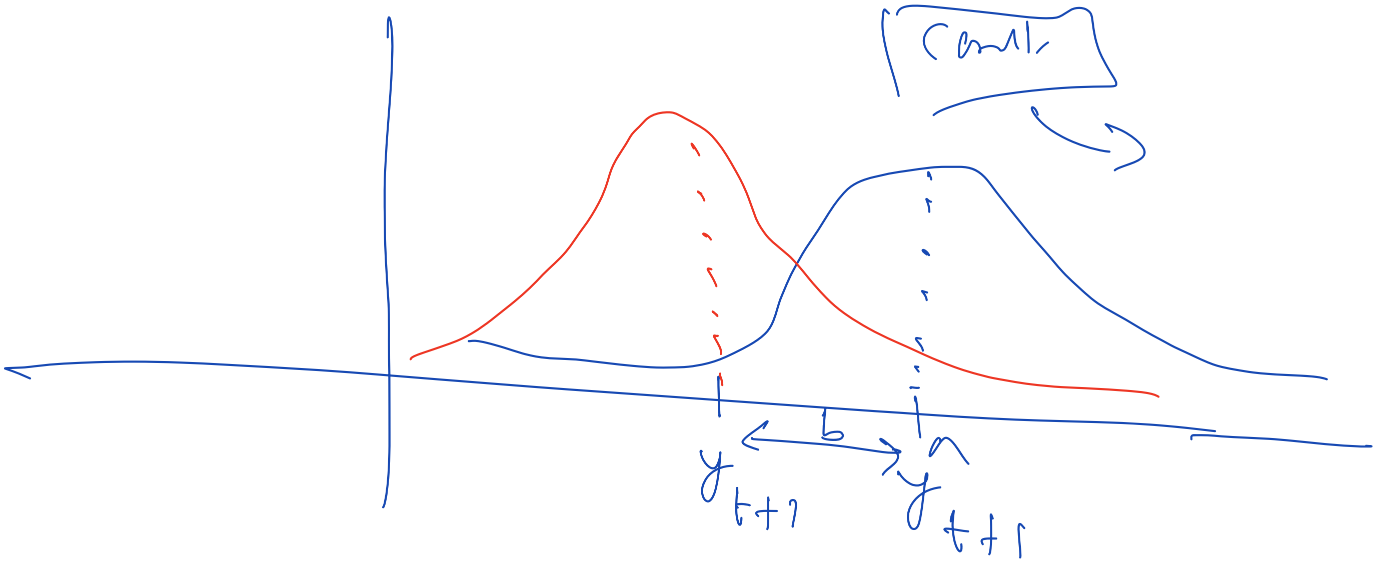
$$Y'_t = y_t - y_{t-s}$$

$$Y'_{t-s} = y_{t-s} - y_{t-2s}$$

$$y = wx + \boxed{b} \rightarrow \text{const value}$$

$$\hat{y}_{t+1} = y_t + \boxed{\mu} \pm 2\sigma$$

const.



$$t = 5$$

$$\begin{bmatrix} [lb_{t+1}, ub_{t+1}], \\ [lb_{t+2}, ub_{t+2}], \\ \vdots \\ [lb_{t+5}, ub_{t+5}] \end{bmatrix}$$