

Quiz 2 — ARMA models

1. What must I absolutely check before fitting an $\text{ARMA}(p, q)$ to a series (X_t) ?

2. What does Wold's theorem state? Write the mathematical formula for a series (X_t) , then give the intuition behind the result.

3. If (X_t) follows an $\text{ARMA}(p, q)$ and (Y_t) follows an $\text{ARMA}(p', q')$, can I say that $X_t + Y_t$ follows an $\text{ARMA}(p+p', q+q')$? Justify your answer.

Questions	Answers
4. If (X_t) follows an $\text{AR}(3)$, what is $\hat{X}_{T+1 T}$? (ϕ denotes the coefficients of the polynomial in L and e the white noise, so that $\phi(L)X_t = \psi(L)e_t$)	☐ $\phi_1 X_T + \phi_2 X_{T-1} + \phi_3 X_{T-2}$ ☐ $\phi_1 e_T + \phi_2 e_{T-1} + \phi_3 e_{T-2}$ ☐ $\frac{1}{\phi_1} X_T + \frac{1}{\phi_2} X_{T-1} + \frac{1}{\phi_3} X_{T-2}$ ☐ $\frac{1}{\phi_1} e_T + \frac{1}{\phi_2} e_{T-1} + \frac{1}{\phi_3} e_{T-2}$
5. Given $(1 - \phi_1 L - \phi_2 L^2)(1 - L)X_t = (1 - \psi_1 L)e_t$, what must I check in order to say that X_t follows an $\text{ARIMA}(2, 1)$?	☐ The roots of $1 - \phi_1 L - \phi_2 L^2$ have modulus greater than 1. ☐ The roots of $1 - \phi_1 L - \phi_2 L^2$ have modulus less than 1. ☐ $\psi_1 > 1$. ☐ $\psi_1 < 1$.

6. What is the difference between an innovation and a white noise?

Questions	Answers
7. Which assumption do I need in order to write $X_{T+1} - \text{EL}[X_{T+1} \mid X_T, \dots] = e_{T+1}?$ (e_t is the white noise of the theoretical model of my series X_t; EL is the linear projection.)	☐ That the empirically estimated model is the correct one. ☐ That the Hilbert space of past observations is a closed convex set. ☐ That the (e_t) are centered, uncorrelated, with finite and constant variance. ☐ That the ARMA(p, q) representation of (X_t) is causal and invertible.