Time Series Exercise Sheet 12

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Exercise 12.1

The model fitted to $z_1, \ldots, z_{100}$ if the model

$$Z_t = -0.4 Z_{t-1} + \epsilon_t$$

where ϵ_t is unit variance Gaussian white noise. We have estimate the ACF and the PACF for the first 12 lags in Table 1.

Table 1: Autocorrelation and Partial Autocorrelation Estimates

lag	1	2	3	4	5	6	7	8	9	10	11	12
ACF	0.799	0.412	0.025	-0.228	-0.316	-0.287	-0.198	-0.111	-0.056	-0.009	0.048	0.133
PACF	0.799	-0.625	-0.044	0.038	-0.020	-0.077	-0.077	-0.061	-0.042	0.089	0.052	0.125

Are these values consistent with the residuals being white? Please explain why/why not?

Exercise 12.2

Show when AIC and AICC start to become the same. Explain your rationale.

Exercise 12.3

Determine the form of AICC when you assume that m coefficients of the ARMA(p,q) model are zero.

Exercise 12.4

Prove that, for an AR(p), we have

$$\alpha_\tau = 0, \qquad \forall \tau > p.$$

Exercise 12.5

For the 6 time series shown in Figure 1, identify if any of the following models could be appropriate

1. White noise,
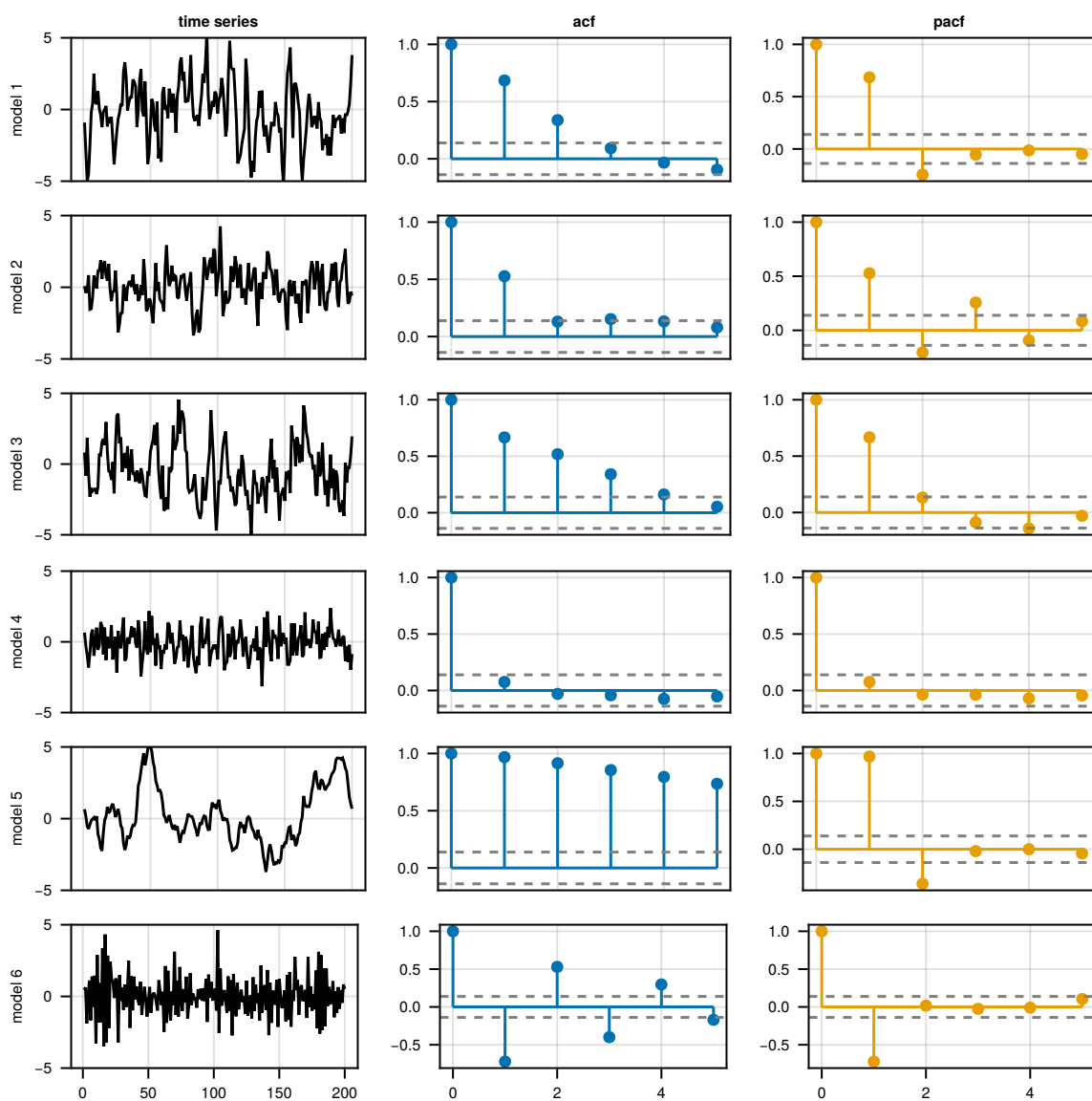
2. MA(q),

3. AR(p),

4. ARMA(p, q).

Give you reasoning.

Figure 1: Time series and their sample acf and pacfs