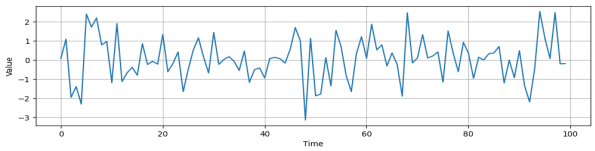
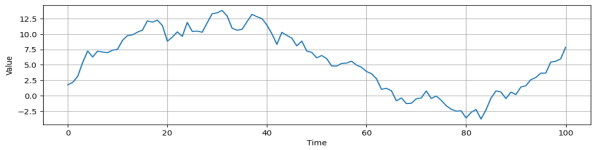
Practice Problems

October 11, 2024

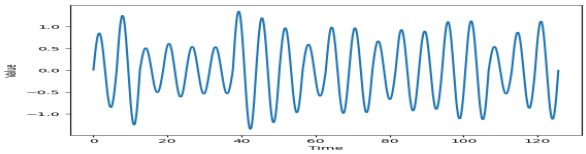
1. Identify if the following time series are stationary or not.



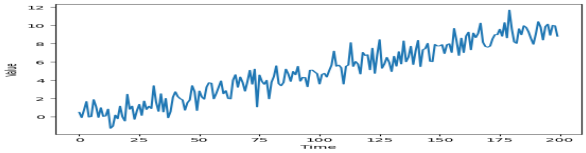
(a)



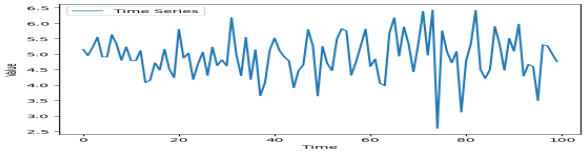
(b)



(c)



(d)



(e)

Figure 1: Which of these are stationary?

2. For the following time series, calculate the coefficients for an AR(1) model.

t	1	2	3	4	5	6	7	8	9	10
x_t	10	9	8	7	16	14	7	13	20	18

3. When $x_t = \eta + \phi_1 x_{t-2} + w_t$ work out the values of mean, variance, auto-correlation, and partial auto-correlation.

4. Express an AR(1) model as an MA(q) model for an adequate value of q.

5. Say Y_t is a weakly stationary time series. Is ΔY_t a weakly stationary time-series? (here Δ is the first difference operator)

6. Say ΔY_t is a weakly stationary time series. Is Y_t a weakly stationary time-series?

7. Which of the following models will have the same ACF to the MA(1) model $x_t = w_t + \theta w_{t-1}$?

   - $x_t = w_t - \theta w_{t-1}$
   - $x_t = w_t + \frac{1}{\theta} w_{t-1}$
   - $x_t = w_t + |\theta| w_{t-1}$
   - None of them