Assignment Three (due 19/03/2024)

1. For each of the following models,

$$\begin{aligned} &(i) \quad (1-0.9B)(Z_t-10)=a_t, \\ &(ii) \quad Z_t=10-0.9a_{t-1}+a_t, \\ &(ii) \quad (1-0.5B)(Z_t-10)=a_t-0.9a_{t-1}, \end{aligned}$$

where $\sigma_a^2=2$. Given $Z_1=1.2$ and $Z_2=0.1$, find the $l-$step ahead forecast values and forecast variances for $l=1,2,3,4$.

2. A sales series was fitted by the ARIMA (2,1,0) model

$$(1-1.4B-0.48B^2)(1-B)Z_t=a_t,$$

where $\hat{\sigma}_a^2=58000$ and the last 5 observations are 560, 580, 640, 770 and 800.

(a). Calculate the forecasts of the next 3 observations.

(b) Find the 95% forecast intervals for the forecasts in (a).

3. Consider the model

$$(1-0.43B)(1-B)Z_t=a_t,$$

and the observations $Z_{49}=33.4$ and $Z_{50}=33.9$.

(a) Compute the forecast $Z_{50}(l)$, for $l=1,2,3,4$, and their 90% forecast intervals.

(b) At time $t=51$, Z_{51} became known and equaled 34.1. Updated the forecast obtained in (a).