

1. Find the four seasonal factors for quarters 1,2,3,4.

To compute the seasonal factors, we first note that our model takes the form

$$y_t = TR_t + SN_t + CL_t + IR_t$$

Using centered moving averages, we may compute our estimate

$$sn_t + ir_t = y - CMA_t$$

We then average by season, and normalize the values as,

$$sn_t = \bar{sn}_t - \left(\sum_{t=1}^L \bar{sn}_t / L \right)$$

Our seasonal factors are then computed as

$$sn_{q1} = 70.59375$$

$$sn_{q2} = 210.76042$$

$$sn_{q3} = -76.94792$$

$$sn_{q4} = -204.40625$$

2. We now predict the values of sales in the next year by the formula $y = tr + sn$. These values are as follows

$$t_{17} \Rightarrow Q_1 = 621.3292$$

$$t_{18} \Rightarrow Q_2 = 781.2515$$

$$t_{19} \Rightarrow Q_3 = 513.2988$$

$$t_{20} \Rightarrow Q_4 = 405.5961$$

3. Finally, we compute the prediction intervals for the first two quarters using the B value from the text. These intervals are then,

$$t_{17} : [535.69235, 706.96598]$$

$$t_{18} : [695.49893, 867.00401]$$