

1. Suppose that a simple moving average of span  $N$  is used to forecast a time series that varies randomly around a constant, that is,  $y_t = \mu + \varepsilon_t$ , where the variance of the error term is  $\sigma^2$ . The forecast error at lead one is  $e_{T+1}(1) = y_{T+1} - M_T$ . What is the variance of this lead-one forecast error?
2. Suppose that a simple moving average of span  $N$  is used to forecast a time series that varies randomly around a constant mean, that is,  $y_t = \mu + \varepsilon_t$ . At the start of period  $t_1$  the process shifts to a new mean level, say,  $\mu + \delta$ . Show that the expected value of the moving average is

$$E(M_T) = \begin{cases} \mu & T \leq t_1 - 1 \\ \mu + \frac{T - t_1 + 1}{N} \delta & t_1 \leq T \leq t_1 + N - 1 \\ \mu + \delta & T \geq t_1 + N \end{cases}$$

3. For the data file assigned to you, plot the original data, centered moving average, and moving median. Comment on the efficacy of the two smoothing techniques, and the appropriate span to use for the smoothing. Also comment on other noteworthy features of the data.

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Jack C	CerealSales
Vincent G	Viscosity
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