Stat 142(Time Series Analysis)

Second Semester AY 2024-2025

Laboratory Exercise No. 2

INSTRUCTIONS: Answer the following as indicated. Prepare your answer sheet in R Markdown and submit in PDF format.

1. The quarterly livestock inventory for Eastern Visayas from 2014-2017 is provided in the table below.

   a. Compute the 3-quarter (centered) moving average series for goat.

   b. Plot the original time series and the 3-quarter (centered) moving average series.

Year	Quarter	Cattle	Hog	Goat
2014	Quarter 1	555	19453	256
	Quarter 2	576	16154	216
	Quarter 3	672	18246	168
	Quarter 4	490	22754	241
2015	Quarter 1	476	19506	205
	Quarter 2	605	15482	175
	Quarter 3	642	18711	153
	Quarter 4	529	22803	247
2016	Quarter 1	443	19331	206
	Quarter 2	637	15882	172
	Quarter 3	672	17954	158
	Quarter 4	554	23223	241
2017	Quarter 1	452	19571	189
	Quarter 2	576	16802	169
	Quarter 3	644	17433	135
	Quarter 4	510	22642	244

2. Show algebraically that a 3×5 moving average is the same as a 7-term moving weighted average with weights of 0.067, 0.133, 0.200, 0.200, 0.200, 0.133, and 0.067.

3. The *retail.xlsx* data contains monthly retail sales of electronic goods and clothing.

   a. Plot the electronics goods time series. Can you spot any seasonality, cyclicity or trend? What do you learn about the series?

   b. Apply the following smoothing methods. For each method, report the smoothing parameters, initial states, RMSE, and the 12-month forecast. Also, generate the time plot of the original series together with the forecast values from April 1984 to December 2009.

- Simple exponential smoothing
- Holt's linear trend method
- Holt's damped trend method

c. Which method best fits the series? Why?