UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

University of Canterbury

Mid-year Examinations 2016

Prescription Number(s): STAT317-16S1 / ECON323-16S1

Paper Title: Time Series Methods

Time Allowed: 2 hours

Number of Pages: 3

Instructions for candidate:

- This is a restricted examination
- Only stickered calculators permitted
- Remember to write your name and student number on all answer booklets/pages
- Start each question on a new page
- All questions are equally worth
- Show all working

QUESTIONS START ON PAGE 3

QUESTION 1

What are the invertibility and stationarity conditions for an ARMA process? Explain the reasons and the importance for such conditions.

QUESTION 2

Given the moving average process:

$x_t = z_t - 0.7 z_{t-1} - 0.5 z_{t-2} \qquad z_t \sim N(0, \sigma^2)$,

Find the values $\rho(k)$ of the autocorrelation function for *k=1,2,3.*

QUESTION 3

Identify the order of the following ARMA(p,q) models and determine whether they are causal and/or invertible:

a) $x_t = 0.8 x_{t-1} - 0.15 x_{t-2} + z_t - 0.3 z_{t-1}$;

b) $x_t = x_{t-1} - 0.5 x_{t-2} + z_t - z_{t-1}$;

where $z_t \sim N(0, \sigma^2)$. Please show all your workings.

QUESTION 4

Illustrate the major steps of the classical decomposition of a time series.

QUESTION 5

Explain why differencing a time series you remove a deterministic trend and why you should not difference more than twice.

QUESTION 6

Show that an invertible MA(k) model for any integer value of k is equivalent to an AR of infinite order and that a causal AR(k) model for any integer value of k is equivalent to a MA of infinite order.

END OF PAPER