

# MTH-442A Assignment-1

## Rubric :

1(a) No partial marks.

1(b) No simplified assumption of  $\gamma(h)$  but correct approach (0.25).

Expression for  $\gamma(h)$  for  $h \geq 0$  but no comment on  $\gamma(h) = \gamma(-h)$  or no derivation for  $h < 0$ , (0.5).

2. Correct expression of  $\gamma(h)$  but no comment on weak stationarity (0.75).

3. (a) If not commented about  $h < 0$  case. (0.5)

Wrong expression (0)

(b)  $CCF(X, Y)$  at lag  $h = \text{corr}(X_{t+h}, Y_t)$

$$= \text{corr}(X_t, Y_{t-h})$$

but not equal to either of  $\boxed{\text{corr}(X_t, Y_{t+h})}$   
( $= \text{corr}(X_{t-h}, Y_t)$ ) [CCF is not symmetric in  $(X, Y)$  and  $(Y, X)$ ].

Wrong formula (0).

4 (a) • Expression for correct  $\gamma(h)$ ,  $h = 0, \pm 1, \pm 2$   
correct expression (0.75)

• Only correct  $\gamma(0) (= \text{Var}[X_t])$  (0.25)

- Correct argument of weak stationarity (0.25).

(b) • No derivation (only "correct definition of strong stationarity") (0.25)

- No definition and no correct definition (0).

5. (a) Exact derivation of non-negative definiteness (0.5). Otherwise (0)

(b) • Exact derivation of nnd conditions for sample autocovariances (1). otherwise (0).

- Partially correct argument (0.25).

6. Exact correct expression (1) otherwise (0).

7. The question asks for "no intercept" regression.

- lm with "intercept" will result -0.5 marks from from total.

(a) Average annual increase of log-earnings  
:  $4\hat{\beta} = 4 \times 0.1672 = 0.6687$

- Exact answer: (0.5) (No partial marks)

(b) Average logged earni rate decrease from  $Q_3$  to  $Q_4$  is  $|\hat{\alpha}_4 - \hat{\alpha}_3| = 0.2686 (\approx 0.2)$   
(Exact answer (0.25)).

$$\begin{aligned} \bullet \text{ Percentage decrement} &= \left( \frac{\hat{\alpha}_4 - \hat{\alpha}_3}{\hat{\alpha}_3} \right) \times 100\% \\ &= 0.081\% \end{aligned}$$

(Exact answer (0.25)).

© Only "correct conclusions" with valid graph (0.5)

(No partial marks).

No conclusion with only graphs (0)

\* Marks may be deducted from some other wrong arguments as well which are question specific and based on instructor's disagreement on the wrong answers.