Hack to Exam: Time Series Analysis

m.a.g.m.a.

1 Retrospective

1.1 Chapter 1

1.1.1 The decomposition of Time Series

$$X_t = m_t + s_t + Y_t$$

where X_t is the time series, m_t is the trend component, s_t is the seasonal component, Y_t is a stationary stochastic process.

1.1.2 The Stationary Series

Definition 1 (Stationary Series) *A time series $\{X_t\,,\,t\in T\}$ is said to be a stationary series, satisfying the condition as follow:*

1. $E(X_t)^2 < \infty$ *for all* $t \in T$
2. $E(X_t) = \mu$ *for all* $t \in T$
3. *let* $\gamma_X(r,s) := E(X_r - \mu)(X_s - \mu))$ *and* $\gamma_X(r,s) = \gamma_X(r+t, s+t)$ *for all* $t \in T$

Definition 2 *A process $\{X_t\,,\,t\in\mathbb{Z}\}$ is said to be a white noise with mean μ and variance σ^2, written*

$$\{X_t\} \sim WN(\mu, \sigma^2)$$

$$\text{if } EX_t = \mu \text{ and } \gamma_X(h) = \begin{cases} \sigma^2 & h = 0 \\ 0 & h \neq 0 \end{cases}$$

1.1.3 Linear Stationary Series and Linear Filter

Definition 3

1.1.4 Normal Time Series

1.1.5 Strict Stationary Series

Definition 4 *The time series $\{X_t \, , \, t \, \in \, \mathbb{Z}\}$ is said to be strictly stationary if the distribution of*

$$(X_{t_1}, \cdots, X_{t_k}) \quad \textit{and} \quad (X_{t_1+h}, \cdots, X_{t_k+k})$$

are the same for all k, and all $t_1, \cdots, t_k, h \, \in \, \mathbb{Z}$

1.1.6 The Spectral Density