

MATH1307 FORECASTING

SAMPLE FINAL TEST QUESTIONS

This **sample** exam is composed of 20 multiple choice questions. Please choose the correct answer for each question by selecting ONE of (A), (B), (C), or (D) on THE MCQ ANSWER SHEET. Answers other than these or selecting multiple options will be counted incorrect.

This exam questions are only sample questions to give some insight into the format of final test. Please be noticed that the number and contents of questions may differ in the actual final test.

1) Commonly used unit root tests are

- a) Augmented Perron test and Phillips Dickey-Fuller test.
- b) Augmented Dickey-Fuller test and Phillips-Perron test.
- c) Augmented Perron test and Phillips-Perron test.
- d) Augmented Dickey-Fuller test and Phillips- Fuller test.

2) What are the basic operations that we will apply with time series data?

- 1. lag operation
- 2. differencing
- 3. transformations

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) 1,2 and 3

3) Before doing a power transformation, the series should

- a) consists of non-zero values.
- b) consists of positive values.
- c) be stationary.
- d) be normally distributed.

4) Which statement is incorrect regarding the parameter λ of the Box-Cox transformation

- a) $\lambda = 1$ refers to a no transformation.
- b) λ is estimated from the observed data.
- c) A precise estimation of λ is always warranted.
- d) $\lambda = -1$ refers to a reciprocal transformation.

5) The components that a time series can be decomposed into

- a) trend, seasonality.
- b) trend, seasonality, remainder.

- c) trend, seasonality, intervention.
- d) trend, seasonality, intervention, remainder.

6) Which one of the following is one of the differences between Koyck models and an ordinary multiple regression model?

- a) One of the explanatory variables is the first lag of the dependent variable in the Koyck model.
- b) One of the explanatory variables is the first lag of the independent variable the Koyck model.
- c) Koyck model does not include an intercept term.
- d) Koyck model does not include an error term.

7) Exponential trend method includes

- a) no trend nor seasonal components.
- b) multiplicative trend and No seasonal components.
- c) additive trend and No seasonal components.
- d) additive trend and Additive seasonal components.

8) AIC and BIC can be used for the state space models with

- a) both additive and multiplicative errors.
- b) only multiplicative errors.
- c) only additive errors.
- d) only additive trend.

9) Which one of the following is the assumption that is made when using a linear structure with seasonal components?

- a) The pattern of seasonality remains through time.
- b) The pattern of seasonality evolves through time.
- c) The variance evolves through time.
- d) Autocorrelation structure changes through time.

10) Please select a possible model to be fitted for a time series given in Figure 1.

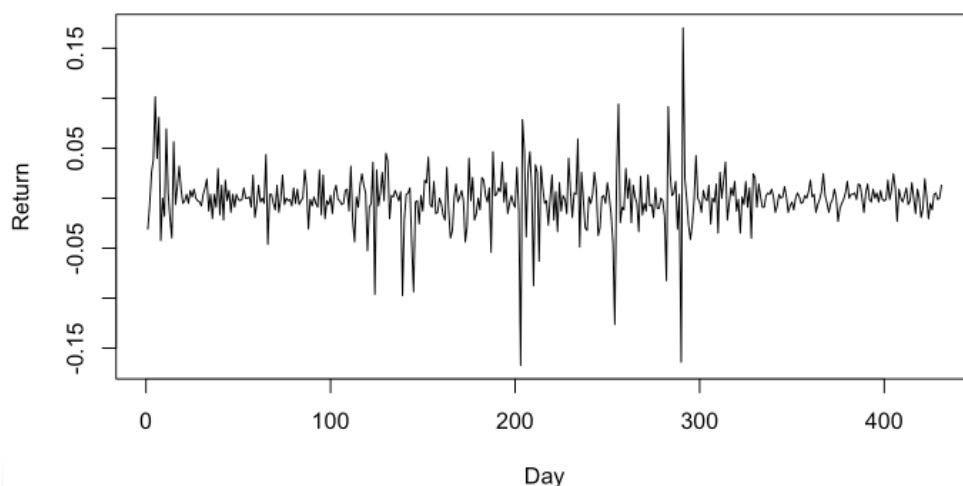


Figure 1: Time series plot

- a) MNM
- b) ANA
- c) MNN
- d) NNN

11) The most direct method of obtaining prediction distributions is to simulate many possible future sample paths from the fitted model, and to estimate the distributions from the simulated data. Which of the following is the drawback of this method?

- a) Predictions will be available only analytically.
- b) We cannot have any algebraic equations for the prediction distributions.
- c) Very difficult to obtain numerical solutions compared to analytical solutions.
- d) Both a and b

12) Which of the following statements are incorrect?

1. Finding the model with the smallest within-sample one-step-ahead forecast errors does assure us that the model will be the best one for forecasting.
2. Finding the model with the maximum likelihood, does assure us that the model will be the best one for forecasting
3. We can use an information criterion which penalizes the likelihood to compensate for the potential overfitting of data.

- a) None
- b) Only 3
- c) 1 and 2
- d) 1 and 3

13) The following set of state-space equations are given:

$$\begin{aligned}\mu_t &= \ell_{t-1} + s_{t-m} \\ \ell_t &= \ell_{t-1} + \alpha \varepsilon_t \\ s_t &= s_{t-m} + \gamma \varepsilon_t\end{aligned}$$

Which of the following is the correct ETS representation of the given state-space equations?

- a) ETS(N,N,N)
- b) ETS(A,N,A)
- c) ETS(N,N,A)
- d) ETS(A,A,A)

14) The following model is given:

$$\begin{aligned}y_t &= (\ell_{t-1} + b_{t-1})(1 + \varepsilon_t), \\ \ell_t &= (\ell_{t-1} + b_{t-1})(1 + \alpha \varepsilon_t), \\ b_t &= b_{t-1} + \beta(\ell_{t-1} + b_{t-1})\varepsilon_t,\end{aligned}$$

Which one of the following is true for the given model?

- a) Errors are multiplicative.
- b) Trend is multiplicative.
- c) Seasonality is multiplicative.
- d) Seasonality is additive.

15) Which one of the following is true?

- a) The pulse function is equal to 1 at the time point T and 0 elsewhere.
- b) The step function is equal to 1 at the time point T and 0 elsewhere.
- c) The pulse function is equal to 0 at the time point T and 1 elsewhere.
- d) The step function is equal to 0 at the time point T and 1 elsewhere.

16) Which one of the following models allows the use of independent series in forecasting?

- a) Local level model.
- b) Autoregressive distributed lag model.
- c) Exponential smoothing model.
- d) Local trend model.

17) Which one of the following is more important in increasing the chances of finding the true optimum estimates along with a reduction in computational load in fitting the model computationally?

- a) Initial values
- b) Software used
- c) Numerical method used
- d) All of the above

18) When does the expected value go towards a limiting value of zero?

- a) When similar damping coefficients into additive models.
- b) When similar damping coefficients into multiplicative models.
- c) When the growth rate to a fractional power.
- d) When the error of the model is additive.

19) Which one of the following is the robust and commonly used decomposition method in time series?

- a) X-11-ARIMA decomposition
- b) X-12-ARIMA decomposition
- c) Classical decomposition
- d) Seasonal and Trend decomposition using Loess decomposition

20) Which of the following are examples of a forecasting problem?

1. Forecasting the stock price for the next 6 days.
2. Forecasting the numbers heads obtained from flipping a fair coin 10 times.

3. Forecasting the daily sales at Coles for the next one week.

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) 1,2 and 3