

Uva Wellassa University

Faculty of Management

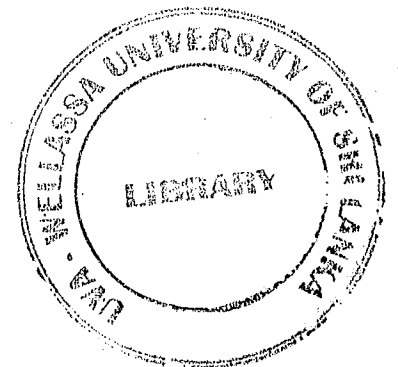
Degree of Bachelor of Business Management in Entrepreneurship and Management

200 LEVEL 1st SEMESTER EXAMINATION – JUNE / JULY 2017

ENM261-2 Business Statistics



**Uva Wellassa
University**

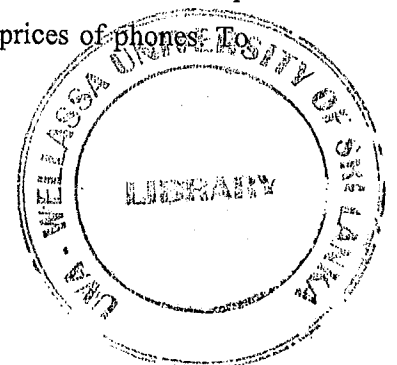


Part C : Essay Questions

1. Trace metals in drinking water affect the flavor and an unusually high concentration can pose a health hazard. Ten pairs of data were taken measuring zinc concentration in bottom water and surface water in sample location.

Location	Zn concentration in bottom water	Zn concentration in surface water
1	4.30	4.15
2	2.66	2.38
3	5.67	3.90
4	5.31	4.10
5	7.07	6.05
6	7.16	6.09
7	6.51	6.32
8	5.89	5.23
9	4.69	4.11
10	7.23	6.12

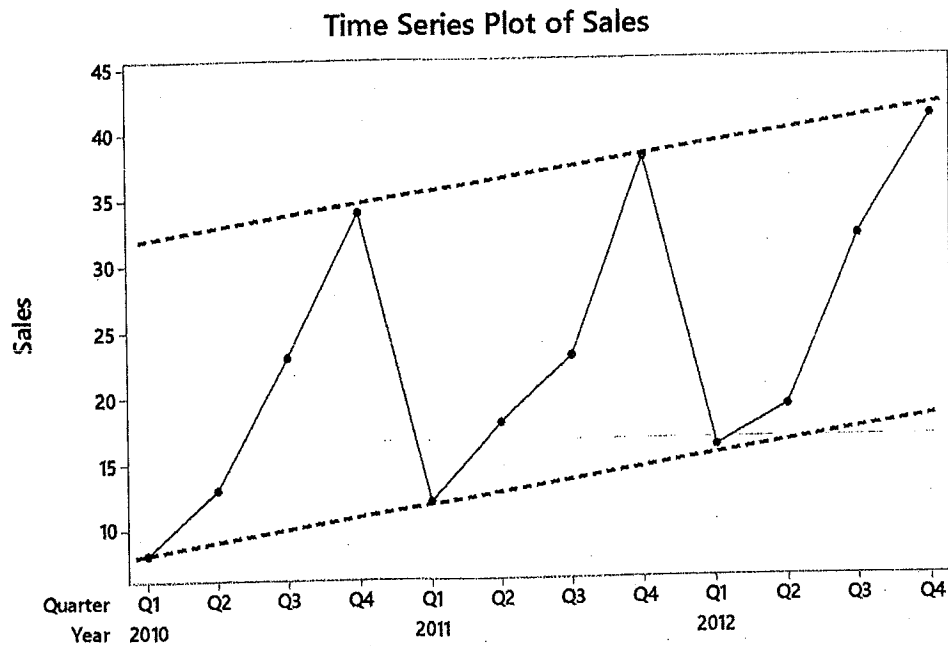
- a) Construct the 95% confidence interval for true mean difference between the Zn concentration in bottom water and the Zn concentration in surface water. (8 Marks)
- b) Write down relevant hypothesis to test on the claim of "There is no significance difference between the Zn concentration in bottom water and the Zn concentration in surface water". (4 Marks)
- c) Test the above mentioned hypothesis at $\alpha = 0.05$ and interpret obtained results. (8 Marks)
- 2.
- a) What is meant by time series data? (2 Marks)
- b) What are the basic 4 components of a time series? (4 Marks)
- c) Briefly describe each component stated on the **part (b)**. (4 Marks)
- d) The data below represent shop sales of a mobile phone over a three year period in quarterly. In order to decide whether to continue selling this mobile phone, the shop owners need to understand the underlying movement in selling prices of phones.



help them, you are required to choose an appropriate smoothing method to answer the following questions.

Year	Quarter	Sales
2010	Q1	8
2010	Q2	13
2010	Q3	23
2010	Q4	34
2011	Q1	12
2011	Q2	18
2011	Q3	23
2011	Q4	38
2012	Q1	16
2012	Q2	19
2012	Q3	32
2012	Q4	41

The time series plot for above sales are given below.



- i. Using the above graph identify whether "Additive model" or a "Multiplicative Model" is most appropriate for forecasting. (2 Marks)
- ii. Using the above data identify seasonal indices for 4 quarters. (8 Marks)

Useful Formula

$$\bar{x} = \frac{\sum x_i}{n}$$

$$S.D. = \sqrt{\frac{\sum (d_i - \bar{d})^2}{n-1}}$$

$$r = \frac{n(\sum x_i y_i) - (\sum x_i)(\sum y_i)}{\sqrt{[n\sum x_i^2 - (\sum x_i)^2][n\sum y_i^2 - (\sum y_i)^2]}}$$

$$S_{xx} = \sum x_i^2 - n\bar{x}^2$$

$$S_{yy} = \sum y_i^2 - n\bar{y}^2$$

$$S_{xy} = \sum x_i y_i - n\bar{x}\bar{y}$$

$$\hat{\beta}_0 = \bar{Y} - \hat{\beta}_1 \bar{X}$$

$$\hat{\beta}_1 = \frac{S_{xy}}{S_{xx}}$$

$$SSR = \hat{\beta}_1^2 S_{xx}$$

$$SST = S_{yy}$$

