

UNIVERSITY OF SWAZILAND



MAIN EXAMINATION PAPER 2016

TITLE OF PAPER : DESCRIPTIVE STATISTICS

COURSE CODE : STA131/ST132

TIME ALLOWED : 2 HOURS

INSTRUCTIONS : ANSWER ANY THREE (3) QUESTIONS.

REQUIREMENTS : SCIENTIFIC CALCULATOR AND GRAPH PAPER.

Question 1

The following scores represent the final examination grade for an elementary statistics course:

23 60 79 32 57 74 52 70 82 36 55 98 88 48 69 80 76 81 62 84 74 77 52 67 74 90 81 10 41 43
15 80 95 41 65 92 85 64 75 78 25 80 71 83 54 64 72 60 78 89 76 84 79 34 67 17 82 85 61

- a) Construct a stem-and-leaf plot for the examination grades in which the stems are 1, 2, 3, ... 9.
(3 Marks)
- b) Construct a relative frequency histogram, draw an estimate of the graph of the distribution and discuss the skewness of the distribution.
(5 Marks)
- c) Compute the sample mean, sample median, and sample standard deviation from the frequency distribution table.
(12 Marks)

Question 2

In a study conducted by the Department of Mechanical Engineering at a university, the steel rods supplied by two different companies were compared. Ten sample springs were made out of the steel rods supplied by each company and a measure of flexibility was recorded for each. The data are as follows:

Company A: 9.3 8.8 6.8 8.7 8.5 6.7 8.0 6.5 9.2 7.0

Company B: 11.0 9.8 9.9 10.2 10.1 9.7 11.0 11.1 10.2 9.6

- a) Calculate the sample mean, median, and variance for the data for the two companies.
(3+3+4 Marks)
- b) Calculate the coefficient of variation for the two companies and comment.
(8 Marks)

Question 3

The Table below gives the unemployment rate and the total personal income for the United States for various years.

Year	Unemployment rate (percent)	Total Personal Income(\$billions)
1975	8.5	1.3
1980	7.1	2.3
1985	7.2	3.4

1990	5.6	4.8
1995	5.6	6.1
2000	4.0	8.3

- a) Use linear regression to predict the total personal income of the United States if the unemployment rate is 5.0%. (10 Marks)
- b) Use linear regression to predict the unemployment rate if the total personal income of the United States is \$10 billion. (4 Marks)
- c) Are the predictions in parts (a) and (b) reliable? Why or why not? (6 Marks)

Question 4

- a) The country X's trade deficit with country Y (billions of Emalangeni) from 2007 through 2014 is reported as shown below.

Year:	2007	2008	2009	2010	2011	2012	2013	2014
Deficit:	15.5	16.6	32.1	51.9	52.8	48.2	51.7	66.5

Using exponential smoothing and the smoothing constant $\alpha = 0.7$, what deficit would have been forecast for 2015?

(12Marks)

- b) The quarterly seasonal indices for a firm's electricity consumption are 115, 92, 81, and 112 for quarters 1 – 4. It has forecast that electricity consumption will be 850,000 kilowatt-hours during 2017. Forecast electricity consumption for each quarter of 2017.

(8 Marks)

Question 5

The Table below reports the prices, and the number of units of each consumed by a typical family for several food items for the years 2005 and 2015.

Item	2005		2015	
	Price (E)	Quantity	Price (E)	Quantity
Bread white (loaf)	7.70	50	19.80	55
Eggs(dozen)	10.50	26	29.80	20
Milk (litre)	8.80	102	19.80	130
Apples, red (500g)	14.60	30	17.50	40
Orange juice (300 ml concentrate)	15.80	40	17.00	41
Coffee, instant (400g)	44.00	12	47.50	12

Calculate Laspeyres', Paasche's, and Fisher's Ideal indexes, and recommend the best index.

(6+6+4+4 Marks)