UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATION PAPER 2012

TITLE OF PAPER	:	DESCRIPTIVE STATISTICS
COURSE CODE	:	ST 132
TIME ALLOWED	:	TWO (2) HOURS
REQUIREMENTS	:	CALCULATOR
INSTRUCTIONS	:	ANSWER ANY FOUR (4) QUESTIONS

Question 1 [25 marks, 4+6+5+5+5]

(a) The arithmetic mean of 75 observations is 52.6 and the arithmetic mean of 25 similar observations is 48.4; determine the Arithmetic Mean of all 100 observations.

(b) Of 500 students, whose mean height is 67.8 inches, 150 are women. If the mean height of 150 women is 62.0 inches, what is the mean height of the men ?

(c) The electricity tarriff has increased by 12 percent, 8 percent and 16 percent per annum over a three year period. Find the average annual increase in tariff.

(d) If a cyclist travels 50km/hour over a stretch of road, and 30km/hour over another hilly 5km stretch of road, find the average speed over the 10km distance.

(e) A training consultant is paid E150 per hour for one 8 hour training programme; E120 per hour on a second training programme of 6 hours and E200 for a 2 hour seminar. What is his average earning per hour over the three engagements?

Question 2 [25 marks, 5+6+4+4+6]

(a) The following marks were obtained in an examination taken by 100 students:

Marks	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50
Frequency	2	3	7	7	8
Marks	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75
Frequency	25	18	12	10	8

(i) Estimate the mark exceeded by the top 25% of the students;

(ii) Suggest a pass-mark if 15% of the students are to fail.

(b) A woman wants to open a small fashion boutique business. Before selecting a location, she would like to be able to predict the profit in Emalangeni that the store may be expected to earn per square metre of selling space. She gathers the following information:

Store size (square metres)	Profit (thousand of Emalangeni)
35	20
22	15
27	17
16	9
28	16
12	7
40	22
32	23

(i) Find the best fitting regression equation of the form $y = a + bx$ ($\sum x^2 = 6246$, $\sum xy = 3781$ and $\sum y^2 = 2313$).

(ii) Estimate profit for a store which is 30 square metres.

(iii) Compute the value of the coefficient of determination and interpret its value.

Question 3 [25 marks, 15+2+2+3+3]

(a) The number of a certain component issued, per day, from stock over a 40 day period is given as follows:

83 80 91 81 88 82 87 97 83 99
75 85 72 92 84 90 87 78 93 98
86 80 93 86 88 83 82 101 89 82
85 95 80 89 84 92 76 81 103 94

Using class intervals $70 - 75$, $75 - 80$, $80 - 85$, *etc.*, draw up a frequency distribution. From the frequency distribution, determine the median and the 7th Decile.

(b) A village grocer's records shows that he sold the following quantities of basic foods at the stated prices in January 1991 and January 1992.

	January 1991		January 1992	
Product	Price	Quantity	Price	Quantity
Milk	25p per pint	6000 pints	30p per pint	6250 pints
Sugar	44p per kilo	2300 kilos	59p per kilo	2600 kilos
Tea	150p per lb	1600 lbs	165p per lb	1800 lbs
Bread	350p per loaf	4200 loaves	40p per loaf	4300 loaves

(i) Explain why a simple aggregative index would be particularly unsuitable for this data;

(ii) Calculate a simple mean of price relatives index using January 1991 as base time and January 1992 as given time;

(iii) Calculate a weighted mean of price relatives index using January 1991 as base time and January 1992 as given time with base time quantities as weights; and

(iv) What can you say about the index calculated in answer to part (iii)?

Question 4 [25 marks, 12+4+4+5]

(a) The number of claims per quarter on household policies submitted to the George branch of an insurance company is as follows:

	Quarter			
Year	**1**	**2**	**3**	**4**
2003	84	53	60	75
2004	81	57	51	73
2005	69	37	40	77
2006	73	46		

Find the seasonal variates.

(b) The following table shows Consumer Price Index (CPI) for the period 2005 to 2009.

Year	CPI
2005	95
2006	100
2007	104
2008	110
2009	120

Compute CPI using 2008 as base year.

(c) In the UK Index of Retail Prices for December 1986 (January 1974=100) the approximate index for beer was around 500 and that for cheese was 400. Consider the following statements about December 1986:

(i) The price of beer was lower than the price of cheese.

(ii) The price of beer was higher than the price of cheese.

(iii) The change in the price of beer was 20 percent greater than the change in the price of cheese since January 1974.

Which of the statement(s) is/are true?

(d) A careful analysis of the causes for absences in a certain factory shows that the probability that an employee will be absent because of substance abuse is 0.03; the probability that the factory manager correctly attributes the absence to substance abuse is 0.80, and the probability that the factor manager incorrectly attributes the absence of substance abuse is 0.05. What is the probability that an absence is attributed to substance abuse by the factory manager is actually due to substance abuse?

Question 5 [25 marks, 5+5+5+5+5]

(a) The summary statistics for two data sets are as follows:

	Sample size	Sample mean
X data	19	7.0
Y data	25	5.1

Compute the mean of the combined data sets.

(b) A police officer classifies a total of 150 reported crimes in 2009 by age (in years) of the criminal and whether the crime is violent or non-violent.

	Age (in years)		
Type of crime	**Under 20**	**20 to 40**	**Over 40**
Violent	27	41	14
Non-violent	12	34	22

You must define the respective event(s) in each case and must use one of the probability rules to compute the following probabilities:

(i) What is the probability of selecting a case to analyse and finding the crime was committed by some one 40 or less than 40 years old?

(ii) What is the probability of selecting a case that involved a violent crime or an offender less than 20 years old?

(iii) Given that a violent crime is selected for analysis, what is the probability the crime was committed by a person under 20 years old?

(iv) Two crimes are selected for review by a Judge. What is the probability that both are violent crime?