

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER 2014

TITLE OF PAPER : DESCRIPTIVE STATISTICS,

COURSE CODE : ST 132

TIME ALLOWED : TWO (2) HOURS

REQUIREMENTS : CALCULATOR

INSTRUCTIONS : THIS PAPER HAS FIVE (5) QUESTIONS. ANSWER ANY FOUR (4) QUESTIONS.

Question 1

[25 marks, 3+4+4+4+5+5]

In a recent study, 889 people aged between 25 and 30 years were asked about their academic achievements and their levels of satisfaction in their current jobs.

Academic achievement was measured by qualifications obtained and categorised as 'none', 'basic', 'intermediate' or 'advanced'.

Job satisfaction was categorised as 'high', 'medium' or 'low'.

Academic Achievement	Job satisfaction			Total
	High	Medium	Low	
Advanced	72	112	?	271
Intermediate	?	64	98	250
Basic	117	?	73	281
None	?	36	?	?
Total	306	?	280	?

- Define the two random variables and their measurement scale.
- Copy the contingency table below and fill in the missing figures.
- What is the probability that a person selected at random has at least basic academic achievement?
- What is the probability that a person selected at random has highly satisfied with their job and has advanced academic achievement?
- What is the probability that a person selected at random has low job satisfaction given that they have intermediate 'qualifications'?
- What is the probability that a person selected at random has either basic 'qualifications' or has low job satisfaction or both?

Question 2

[25 marks, 4+4+4+8+5]

- A fish shop owner recorded the daily turnover of his outlet for 300 trading days as shown in the following table.

Daily turnover	Number of days
500– < 750	15
750– < 1000	23
1000– < 1250	55
1250– < 1500	92
1500– < 1750	65
1750– < 2000	50

- Compute and interpret the average *daily turnover* of the fish shop.
- Find the median daily turnover of the fish shop. Interpret its meaning.
- Identify the maximum daily turnover associated with the slowest 25% of trading days.
- Compute the coefficient of skewness and interpret its meaning.

(b) 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?

Question 3

[25 marks, 6+10+2+3+4]

(a) The data in the table below show average hourly wage rates in SZL and numbers of employees in a particular medium-sized company. Employees are categorised as semi-skilled, skilled or managerial; the average wage rates are for the years 2000 and 2010.

Grade of employee	Year 2000		Year 2010	
	Average hourly wage, SZL	Number of employees	Average hourly wage, SZL	Number of employees
Semi-skilled	7.15	37	9.52	19
Skilled	9.04	24	13.25	35
Managerial	11.84	11	17.65	20

- (i) Using 2000 as base year, calculate wage cost relatives for each grade of worker in 2010. Comment on what these figures, together with the data on numbers of employees, tell you.
- (ii) Calculate also the Laspeyres index of wage costs and the Laspeyres index of the number of employees.

(b) The following data are the heights, correct to the nearest centimetre, for a group of children.

144 132 138 129 135 137 143 152 126 137
161 133 129 132 133 146 141 154 147 136

- (i) Explain briefly the distinction between continuous and discrete data, illustrating your answer by referring to these data.
- (ii) Draw a stem and leaf diagram of the data.
- (iii) Find the inter-quartile range of the data.

Question 4

[25 marks, 10+2+7+3+3]

(a) The data in the table below show quarterly house sales in a region of Scotland for 22 successive quarters. The table also shows the appropriate centred moving average.

- (i) Calculate the missing values shown as *a*, *b* and *c*.

- (ii) Without doing any calculations, describe the variation shown in the data across the four quarters of the year.
- (iii) Calculate the seasonal factors. Do seasonal forces significantly influence sales? Comment.

Quarter	Sales	Moving average
1	207	
2	223	
3	364	286.375
4	355	294.25
1	200	306.25
2	293	<i>a</i>
3	390	331.875
4	399	358
1	291	381.75
2	411	409.25
3	462	429
4	547	423.625
1	<i>b</i>	421.5
2	358	416.25
3	498	405.625
4	469	419.75
1	294	436.5
2	478	437.75
3	512	437.75
4	465	<i>c</i>
1	298	
2	337	

- (b) The table shows the average price, in pence, of a litre of petrol in Swaziland on 31 December each year from 2003 to 2011.

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
Price (c)	76.02	84.17	87.35	85.47	102.13	92.79	108.73	119.21	133.38

- (i) Calculate the percentage change in the price of petrol from the previous year, for the years to December 2005 and December 2008.
- (ii) Taking 2003 as base year, express the price of petrol in 2004 and 2011 as index numbers.

Question 5

[25 marks, 9+5+1+3+4+3]

- (a) The table below shows the fuel consumption in litres per kilometre travelled for 9 types of aircraft labelled A1. It also shows the maximum number of passengers that the type of aircraft carries.

Aircraft type	A	B	C	D	E	F	G	H	I
Fuel consumption (l/km)	0.59	3.02	3.05	3.12	2.41	10.2	3.40	3.15	3.81
Number of passengers	6	132	105	118	102	286	69	59	116
Fuel economy (l/km/passenger)	0.0983			0.0264	0.0236		0.0493	0.0534	0.0328

The fuel economy for an aircraft takes into account the number of passengers it carries. It is defined as the fuel consumption in litres per kilometre per passenger.

- (i) Calculate the fuel economy for the aircraft of types B, C and F.

Draw a scatter diagram showing fuel economy on one axis and the number of passengers carried on the other.

Identify two outlying observations on your scatter diagram and state which aircraft type they represent. Briefly discuss the fuel consumptions of these two types of aircraft.

- (ii) You are given that the product-moment correlation coefficient for fuel economy and number of passengers is 0.56. Comment on this figure in the light of your scatter diagram.

Calculate the product-moment correlation coefficient after the two outlying observations are removed.

Briefly discuss the relationship between fuel economy and number of passengers carried.

- (b) Data are handled on computer networks in packets. The size of a packet is measured in bytes. The number of bytes in a packet is a power of 2.

In one 24-hour period, a particular computer network handled packets of data as follows.

Size of packet in bytes	64	128	256	512	1024	2048	4096
Number of packets	12 700	11 920	1840	1030	370	320	3560

- (i) Write down the modal packet size.
- (ii) Find the median packet size.
- (iii) Calculate the mean packet size.
- (iv) Describe in words how the packet sizes vary. Discuss briefly whether the mode, median and mean are useful measures in this case.