

UNIVERSITY OF SWAZILAND

MAIN EXAMINATION PAPER 2012

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, 4+2+8+3+8]

The Chamber of Commerce conducted a survey amongst 17 furniture retailers to identify the *percentage of bad debts* in each of the company's debtors' book. The bad debts percentages are as follows:

| | | | |
|-----|-----|-----|-----|
| 2.2 | 4.7 | 6.3 | 5.8 |
| 5.7 | 7.2 | 2.6 | 2.4 |
| 6.1 | 6.8 | 2.2 | |
| 5.7 | 3.4 | 6.6 | |
| 1.8 | 4.4 | 5.4 | |

- Construct a stem and leaf diagram of the data.
- Find the average % of bad debts amongst the 17 furniture retailers.
- Compute the first quartile and the third quartile of the % of bad debts amongst the 17 furniture retailers surveyed. Interpret these quartiles.
- The chamber of commerce monitors bad debts levels based on samples of companies. It will advise an industry to take corrective action if the % of bad debts, on average, exceeds 5%. Should the chamber of commerce send out an advisory note to all furniture retailers based on these sample findings? Justify your answer.
- Calculate the coefficient of skewness. Interpret this result.

Question 2

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

- An economist conducted a study to identify the *percentage of family income allocated to the purchase of groceries*. She surveyed a random sample of 50 families and compiled the following table.

| Percent of Income | Number of families |
|-------------------|--------------------|
| 10-under 20% | 6 |
| 20-under 30% | 14 |
| 30-under 40% | 16 |
| 40-under 50% | 10 |
| 50-under 60% | 4 |

- Compute and interpret the mean percentage of family income allocated to grocery purchase.
 - What is the maximum percentage of income that is allocated to grocery purchase by the lower 50% of families?
 - 25% of families spend more than a specific percentage of their income on groceries. What is that *percentage of income* value?
- Two insurance companies (Federal Insurance and Baltic Insurance) both use the Laspeyres index number approach to represent how the number of claims processed annually have either increased or decreased. In 2005 the two companies merged, but decided to maintain separate records of claims processed annually. To make comparisons possible between the two companies, management agree

that their respective index series should have a common base period on 2005. The index series of claims processed for each company is given below:

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------------------------------|------|-------|------|-------|-------|-------|
| Federal Insurance (base=2003) | 92.3 | 95.4 | 100 | 102.6 | 109.4 | 111.2 |
| Baltic Insurance (base=2004) | 93.7 | 101.1 | 98.2 | 100 | 104.5 | 107.6 |

- (i) Calculate the revised index for both companies with 2005 as the common base period. Calculate to one decimal place.
- (ii) Which company showed the bigger increase in claims processed between 2003 and 2005?

Question 3

[25 marks, 5+10+5+5]

- (a) The price of a kilogram of sugar increased by 5%, 12%, 6%, 4%, 9% and 3% over the past 6 years. Find the *average annual percentage increase* in the price of sugar (per kg).
- (b) The management of an office complex in Manzini wants to understand the pattern of energy consumption in the complex. They have assembled quarterly data on energy costs for three years (in SZL10000).

| Year | Quarter | | | |
|------|---------|--------|--------|--------|
| | Summer | Autumn | Winter | Spring |
| 2004 | 2.4 | 3.8 | 4.0 | 3.1 |
| 2005 | 2.6 | 4.1 | 4.1 | 3.2 |
| 2006 | 2.6 | 4.5 | 4.3 | 3.3 |

Compute the *seasonal variates* for the complex's energy costs. Comment on their values.

- (c) Find the average price paid per share in an equity portfolio consisting of: 40 shares bought for SZL15 each; 10 shares bought for SZL20 each; 5 shares bought for SZL40 each; and 50 shares bought for SZL10 each.
- (d) Which of the following statements are true and which are false. If the *median* mass of 5 parcels for delivery by a courier service is 6.5 kilograms and one further 7 kilogram parcel is added to the consignment, then:
 - (i) the new median mass will be about 6.6 kilograms
 - (ii) the median will increase
 - (iii) it is impossible for the new median mass to be less than it was
 - (iv) it is impossible for the new median mass to stay exactly at 6.5 kilograms
 - (v) the median may increase, but that depends on the actual masses of all 6 parcels.

Question 4

[25 marks, 2+6+8+4+5]

- (a) A bank wanted to find out whether *loan applications received* are influenced by the current *interest rate*. The manager selected 11 monthly periods where different interest rates applied and recorded the number of loan applications received. The data are given in the following table:

| Loan applications received | |
|----------------------------|-------------------|
| Interest rate % | Loan applications |
| 7 | 18 |
| 6.5 | 22 |
| 5.5 | 30 |
| 6 | 24 |
| 8 | 16 |
| 8.5 | 18 |
| 6 | 28 |
| 6.5 | 27 |
| 7.5 | 20 |
| 8 | 17 |
| 6 | 21 |

- (i) Identify the dependent variable (y) and the independent variable (x).
- (ii) Compute the correlation coefficient between the *rate of interest* and number of *loan applications received*. Comment on the strength of the association.
- (iii) Derive the least squares regression line between the *rate of interest* and number of *loan applications received*. Interpret the regression coefficients.
- (iv) How many loan applications can the bank expect to receive when the interest rate is 6%..
- (b) The following measures of location were calculated for a distribution of the number of persons per household in Mdzimba:

mode = 2 persons; mean=4.1 persons; median=3 persons

If there are 9245 households in Mdzimba, which of the following procedures is appropriate to calculate the likely total number of persons living in Mdzimba.

- (i) multiply the number of households by 2
- (ii) multiply the number of households by 4.1
- (iii) multiply the number of households by 3.

Question 5

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

- (a) Consider the following two-way pivot table of *brand preference* for digital cameras and their *primary usage* (professional and personal).

| Usage | Digital Camera Brand Preference | | |
|--------------|---------------------------------|-------|--------|
| | Canon | Nikon | Pentax |
| Professional | 48 | 15 | 27 |
| Personal | 30 | 95 | 65 |

- (i) What is the probability of selecting a *professional* user?
- (ii) Find the probability that a user prefers the *Pentax brand* given that their usage is primarily for *personal* use?
- (iii) What is the likelihood that a randomly selected user prefers the *Canon brand* and is a *professional* user?
- (iv) Find the probability of randomly selecting either a *professional* user or a user who prefers the *Nikon brand* of digital camera?
- (b) Two groups of bank trainees wrote a banking exam with the following results:

| | Mean | Variance | Sample Size |
|---------|------|----------|-------------|
| Group 1 | 76 | 110 | 34 |
| Group 2 | 64 | 88 | 26 |

- (i) Compute the mean of the combined *exam scores*.
- (ii) Which group showed greater consistency in *exam scores*? Why?