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MAIN EXAMINATION

JANUARY – APRIL 2015 TRIMESTER

FACULTY OF COMMERCE

DEPARTMENT OF ACCOUNTING AND FINANCE

REGULAR PROGRAMME

CMS 510: MANAGERIAL STATISTICS

Date: April 2015

Duration: 3 Hours

INSTRUCTIONS: Answer ALL Questions

- Q1 a) i You read in a Finance Journal, the Wall Street Journal, that corporate debt averages 90 percent of equity for the Fortune 500 firms. The Journal reports that the standard deviation is 25 percent and debt-to-equity ratios are normally distributed. How many of the 500 firms have debt-to-equity ratio above 40% **(4 Marks)**
- ii The mean lifetime of a wrist watch is 25 months, with a standard deviation of 5 months. If the distribution is normal, for how many months should a guarantee be made if the manufacturer does not want to exchange or replace more than 10% of the watches **(4 Marks)**
- b) i Sampling and related concepts such as sampling distribution of the sample mean and the central limit theorem are key concepts in inferential statistics. Define the term central limit theorem. How useful is the theorem in inferential statistics and application? **(3 Marks)**

- ii What sample size enables you to use the normal deviate (standard normal distribution), even when the distribution of the parent population from where the sample was drawn is not known. Why can you use the normal deviate in such cases? **(3 Marks)**
- iii Make a distinction between sampling error and non-sampling error. How do you minimize the sampling error and the non-sampling error? **(3 Marks)**
- iv A sampling distribution with $n=10$ has a mean of $\bar{x}=105^4$ and a standard error of 10.2. What are the mean and standard deviation of the population? **(4 Marks)**
- v The Dome Burger Restaurant chain claims that the mean waiting time of customers is less than 3 minutes with a population standard deviation of 1 minute. The quality assurance department found in a sample of 50 customers at the Wabera Street Dome Burger in the city of Nairobi that the mean waiting time was 2.75 minutes. Does sample evidence support the claim by the Dome Burger chain? Support your answer **(4 Marks)**
- Q2. a) i Make a distinction between a point estimate and an integral estimate of a population parameter **(2 Marks)**
- ii What are the limitations of a point estimate, provide at least two limitations **(2 Marks)**
- iii The Human Resource Department of your company would like to include a dental plan as part of the benefits package. The question is: How much does a typical employee and his or her family spend per year on dental expenses? A sample of 45 employees reveals the mean amount spent last year was Shs. 1,820 with a standard deviation of Shs. 660. The Managing Director of your company indicated he could afford Shs. 1,700. Is it possible that the population mean could be Shs. 1,700. Justify your answer. **(4 Marks)**

v The operations manager of a plant making cellular phones has proposed rearranging the production process to be more efficient. She wants to estimate the time to assemble the telephone using the new arrangement. She believes that the population standard deviation is 12 seconds. How large a sample of workers should she take to estimate the mean assembly time to within 3 seconds with 95% confidence? **(4 Marks)**

b) Outline the steps in carrying out a hypothesis test, clearly defining the concepts there in. **(9 marks)**

c) Make a distinction between type I and type II errors in hypotheses testing. What conclusion is appropriate when we reject the null hypothesis and why? **(4 marks)**

Q3 a) A machine that produces ball bearings is set so that the average diameter is 0.50 inch. A sample of 10 ball bearings was measured with the results shown here.

0.46 0.45 0.49 0.52 0.53 0.48
0.49 0.47 0.46 0.51

The quality control inspector is not sure that the mean diameter of the ball bearings is 0.50. Conduct an appropriate test of hypothesis to help him make a decision on whether the machine is performing as required or not. Use the 5% significance level. **(15 Marks)**

b) While serving as an intern for a major insurance company after completing your undergraduate studies you were involved in a study to measure the mean life expectancy of alcoholics as opposed to those who do not drink excessively. The company felt that insurance costs were affected by the shorter life span of heavy drinkers. The mean age at death for 100 alcoholics was found to be 63.7 years. The population standard deviation is known to be 17.7 years. 100 moderate and non drinkers lived an average of 75.2 years with a population standard deviation known to be 8.7 years.

Required:

Conduct an appropriate test of hypothesis to determine whether the mean life of heavy drinkers is shorter than that of moderate drinkers and non-drinkers. Are the company's worries justified?

Use $\alpha = 0.05$

(10 Marks)

- Q4 (a) Ms Lisa is the financial controller of Nation Media, Inc. She should like to compare the daily travel expenses for the sales staff and the audit staff. She collected the following sample information

Sales (K£)	1310	1350	1460	1650	1360	1420	
Audit (K£)	1300	1020	1290	1430	1490	1200	1390

Perform an appropriate test of hypothesis to determine whether the mean daily expenses are greater for the sales staff than the audit staff by performing the following tasks. Use the 0.10 significance level.

- i) State the appropriate null and alternative hypotheses **(2 Marks)**
- ii) Compute the sample mean for sales staff \bar{x}_1 and sample mean for audit staff \bar{x}_2 **(2 Marks)**
- iii) Compute the sample standard deviation for sales staff (s_1) and the sample standard deviation for audit staff (s_2) **(4 Marks)**
- iv) Are you going to use a z-test or t-test for the hypothesis test? Support your answer **(1 Mark)**
- v) State the decision rule **(2 Marks)**
- vi) Compute the value of the test statistic **(4 Marks)**
- vii) What is the decision regarding H_0 ? Interpret the decision **(1 Mark)**

- b) In an ANOVA table MSE was equal to 20. Random samples of four were selected from each of three populations, where the sum of squares total was 500.
- i Complete the ANOVA table **(5 Marks)**
 - ii Set up the null and alternate hypothesis **(2 Marks)**
 - iii At the 0.05 significance level what is the decision regarding the null hypothesis **(2 Marks)**

END