

SCHOOL OF ACCOUNTING AND BUSINESS
BSc. (APPLIED ACCOUNTING) GENERAL / SPECIAL DEGREE
PROGRAMME

YEAR I SEMESTER II (Group B)
END SEMESTER EXAMINATION – JANUARY 2015

QMT 10230 Business Statistics

Date : 01st February 2015
Time : 2.00 p.m. – 5.00 p.m.
Duration : Three (03) Hours

Instructions to Candidates:

- Answer only **FIVE** (05) questions.
- The total marks for the paper is 100.
- All questions carry equal marks.
- Use of scientific calculator is allowed.
- Standard Normal Table and Formula Sheets are provided.
- Graph Papers are provided on request.
- Answers should be written neatly and legibly.

Question No. 01

- i. A group committed to quality television has been concerned about a new talk show. For two weeks, they decide to count the number of words that must be "bleeped" as too obscene for television and the number of physical altercations. They hope that after recording this data that they will be able to argue that the show is inappropriate for television particularly during the day. The data for number of words censored is provided below.

342 267 321 157 033 349 254 166 132 289

Find the Mean, Standard deviation of the number of words censored.

- ii. A survey of students' favorite after-school activities was conducted at a school. The table below shows the results of this survey.

| Students' Favorite After-School Activities | |
|---|---------------------------|
| Activity | Number of Students |
| Play Sports | 45 |
| Talk on Phone | 53 |
| Visit With Friends | 99 |
| Earn Money | 44 |
| Chat Online | 66 |
| School Clubs | 22 |
| Watch TV | 37 |

Represent the above data using an appropriate chart

Question No. 02

Ten sales staff in a large company were given a creativity test (scores range from 0 to 20, with higher scores indicating greater creativity) and were evaluated regarding sales growth performance (a score of 100 indicates an average performance, and larger scores indicate better performance). The creativity scores and sales growth performance scores are given below.

| | | | | | | | | | | |
|------------------|----|----|----|-----|-----|----|----|-----|-----|-----|
| Creativity score | 09 | 07 | 08 | 13 | 10 | 10 | 09 | 18 | 10 | 14 |
| Sales growth | 93 | 89 | 95 | 101 | 102 | 96 | 95 | 111 | 103 | 107 |

The manager wants to investigate whether creative people tend to perform better with regard to sales growth. So the manager requests to find the solution to the following questions.

- i. Identify the predictor and the response variable
- ii. Draw the scatter plot and identify whether there is a linear relationship between the two given variables
- iii. Calculate the Pearson's correlation coefficient and interpret
- iv. If it is reasonable to develop the least square regression line, develop the least square regression line
- v. Interpret the regression line
- vi. If a Person's creative score is 11, according to your model what would be the expected sales growth.

Question No. 03

The following table gives the quarterly sales figures (in 0000's) of a retail store outside the city.

| | Seasons | | | |
|-------------|----------------|-----------|-----------|-----------|
| Year | Q1 | Q2 | Q3 | Q4 |
| 2011 | 05 | 08 | 16 | 17 |
| 2012 | 22 | 28 | 26 | 35 |
| 2013 | 36 | 39 | 44 | 41 |
| 2014 | 47 | 55 | 60 | 65 |

You are an undergraduate student at a university in the city. During this semester you follow the Business Statistics module in which you learn the basics of time series analysis. The module lecturer asks each student in your class to use this given data in an appropriate way to find the solution to the following questions.

- i. Using an appropriate moving average method find the trend
- ii. Using an appropriate model find the seasonal components
- iii. Adjust the seasonal components
- iv. Interpret your seasonal components
- v. The above said retail store declares a sales of 950000 in the fourth quarter of a particular year, seasonally adjust this figure (give your answer to the nearest integer)

Question No. 04

- i. A newly married couple plan to have 5 children. What is the probability that they will have 3 girls?
- ii. Fifty percent of the population has a particular disease. A test is developed for the disease. The test gives a false positive 3% of the time and a false negative 2% of the time.
 - a. What is the probability that a random person tests positive?
 - b. Joe just got the bad news that the test came back positive, what is the probability that Joe has the disease?
- iii. A life insurance salesman sells on the average 3 life insurance policies per week. Use Poisson's law to calculate the probability that in a given week he will sell
 - a. one policy
 - b. 2 or more policies but less than 5 policies.

Question No. 05

Fast-food restaurants spend quite a bit of time studying the amount of time cars spend in their drive-through. Certainly, the faster the cars get through the drive-through, the more the opportunity for making money. In 2014, a well-known Magazine studied drive-through times for fast-food restaurants and *DaDy's* had the best time, with a mean time spent in the drive-through of 148.5 seconds. Assuming drive-through times are normally distributed with a standard deviation of 29 seconds, answer the following.

- i. What is the probability that a randomly selected car will get through *DaDy's* drive-through in less than 110 seconds?
- ii. What is the probability that a randomly selected car will spend more than 165 seconds in *DaDy's* drive-through?
- iii. What proportion of cars spends between 2 and 3 minutes in *DaDy's* drive-through?
- iv. Would it be unusual for a car to spend more than 4 minutes in *DaDy's* drive-through? Why?

Question No. 06

- i. A manufacturing process produces ball bearings with diameters that have a normal distribution with known standard deviation of 0.04 centimeters. Ball bearings with diameters that are too small or too large are undesirable. In order to test the claim that the mean diameter (μ) is 0.50 centimeters, perform a two-tailed hypothesis test at the 5% level of significance. Assume that a random sample of 36 ball bearings gave a mean diameter of 0.51 centimeters. Perform a hypothesis test (6 step procedure outlined in class) and state your decision. Further find a 99% confidence interval for the mean diameter of the ball bearings produced.
- ii. Briefly describe the following
- Type I error
 - Type II error

Question No. 07

- i. The following table gives the summary of a particular food item from the year 2010 to 2014

| Year | 2010 | 2011 | 2012 | 2013 | 2014 |
|-------|------|------|------|------|------|
| Price | 120 | 144 | 168 | 216 | 204 |

- Compute the Fixed Base Index numbers taking 2010 as the base year
 - Compute the Chain Base Index numbers
 - Interpret both the indices for the year 2014
- ii. Discuss the importance of a thorough knowledge in Statistics for a Manager

FORMULA SHEET

$$\bar{X} = \frac{\sum X}{n}$$

$$\bar{X} = \frac{\sum fX}{\sum f}$$

$$SD = \sqrt{\frac{\sum (X - \bar{X})^2}{n - 1}}$$

$$SD = \sqrt{\frac{\sum f(X - \bar{X})^2}{\sum f - 1}}$$

$$MAD = \frac{1}{n} \sum |X - \bar{X}|$$

$$MAD = \frac{\sum f |X - \bar{X}|}{\sum f}$$

$$C.V. = \frac{SD}{Mean} \times 100$$

$$WAM = \frac{\sum wX}{\sum w}$$

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{[n \sum x^2 - (\sum x)^2] \times [n \sum y^2 - (\sum y)^2]}}$$

$$\text{Coefficient of Determination} = 100 r^2$$

$$r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}}$$

$$\beta_1 = \frac{n \sum xy - \sum x \sum y}{[n \sum x^2 - (\sum x)^2]}$$

$$\beta_0 = \frac{\sum y}{n} - \beta_1 \frac{\sum x}{n}$$

$$\beta_1 = \frac{S_{xy}}{S_{xx}}$$

$$R = 1 - \frac{6 \sum d^2}{n(n^2 - 1)}$$

$$\Pr[A \cup B] = \Pr[A] + \Pr[B] - \Pr[A \cap B]$$

$$\Pr[A'] = 1 - \Pr[A]$$

$$\Pr[A \cap B] = \Pr[A] \times \Pr[B]$$

$$\Pr[A|B] = \frac{\Pr[A \cap B]}{\Pr[B]}$$

$$\Pr[X = x] = {}^nC_x p^x (1 - p)^{n-x}$$

$$\Pr[X = x] = \frac{e^{-\lambda} \lambda^x}{x!}$$

$$E[X] = \sum x \Pr[X = x]$$

$$Z = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}}$$

$$T = \frac{\bar{x} - \mu_0}{s / \sqrt{n}}$$

$$Z = \frac{(\bar{x}_1 - \bar{x}_2) - d_0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$$T = \frac{(\bar{x}_1 - \bar{x}_2) - d_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$I_L = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100$$

$$I_P = \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times 100$$

$$I_F = \sqrt{I_L \times I_P}$$

$$Z = \frac{\bar{X} - \mu_0}{\left(\frac{\sigma}{\sqrt{n}}\right)}$$

$$T = \frac{\bar{X} - \mu_0}{\left(\frac{s}{\sqrt{n}}\right)}$$

$$Z = \frac{(\bar{X}_1 - \bar{X}_2) - \mu_d}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$$T = \frac{(\bar{X}_1 - \bar{X}_2) - \mu_d}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$T = \frac{(\bar{X}_1 - \bar{X}_2) - \mu_d}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

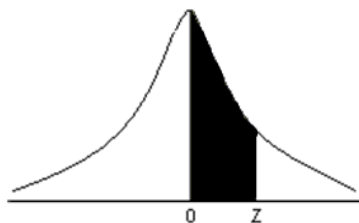
$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$$

$$\bar{X} \pm Z_{\frac{\alpha}{2}} \left\{ \frac{\sigma}{\sqrt{n}} \right\}$$

$$\bar{X} \pm t_{\frac{\alpha}{2}, n-1} \left\{ \frac{s}{\sqrt{n}} \right\}$$

$$\hat{p} \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

The Standard Normal Distribution Table



| | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
|------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0.0 | 0.0000 | 0.0040 | 0.0080 | 0.0120 | 0.0160 | 0.0199 | 0.0239 | 0.0279 | 0.0319 | 0.0359 |
| 0.1 | 0.0398 | 0.0438 | 0.0478 | 0.0517 | 0.0557 | 0.0596 | 0.0636 | 0.0675 | 0.0714 | 0.0753 |
| 0.2 | 0.0793 | 0.0832 | 0.0871 | 0.0910 | 0.0948 | 0.0987 | 0.1026 | 0.1064 | 0.1103 | 0.1141 |
| 0.3 | 0.1179 | 0.1217 | 0.1255 | 0.1293 | 0.1331 | 0.1368 | 0.1406 | 0.1443 | 0.1480 | 0.1517 |
| 0.4 | 0.1554 | 0.1591 | 0.1628 | 0.1664 | 0.1700 | 0.1736 | 0.1772 | 0.1808 | 0.1844 | 0.1879 |
| 0.5 | 0.1915 | 0.1950 | 0.1985 | 0.2019 | 0.2054 | 0.2088 | 0.2123 | 0.2157 | 0.2190 | 0.2224 |
| 0.6 | 0.2257 | 0.2291 | 0.2324 | 0.2357 | 0.2389 | 0.2422 | 0.2454 | 0.2486 | 0.2517 | 0.2549 |
| 0.7 | 0.2580 | 0.2611 | 0.2642 | 0.2673 | 0.2704 | 0.2734 | 0.2764 | 0.2794 | 0.2823 | 0.2852 |
| 0.8 | 0.2881 | 0.2910 | 0.2939 | 0.2967 | 0.2995 | 0.3023 | 0.3051 | 0.3078 | 0.3106 | 0.3133 |
| 0.9 | 0.3159 | 0.3186 | 0.3212 | 0.3238 | 0.3264 | 0.3289 | 0.3315 | 0.3340 | 0.3365 | 0.3389 |
| 1.0 | 0.3413 | 0.3438 | 0.3461 | 0.3485 | 0.3508 | 0.3531 | 0.3554 | 0.3577 | 0.3599 | 0.3621 |
| 1.1 | 0.3643 | 0.3665 | 0.3686 | 0.3708 | 0.3729 | 0.3749 | 0.3770 | 0.3790 | 0.3810 | 0.3830 |
| 1.2 | 0.3849 | 0.3869 | 0.3888 | 0.3907 | 0.3925 | 0.3944 | 0.3962 | 0.3980 | 0.3997 | 0.4015 |
| 1.3 | 0.4032 | 0.4049 | 0.4066 | 0.4082 | 0.4099 | 0.4115 | 0.4131 | 0.4147 | 0.4162 | 0.4177 |
| 1.4 | 0.4192 | 0.4207 | 0.4222 | 0.4236 | 0.4251 | 0.4265 | 0.4279 | 0.4292 | 0.4306 | 0.4319 |
| 1.5 | 0.4332 | 0.4345 | 0.4357 | 0.4370 | 0.4382 | 0.4394 | 0.4406 | 0.4418 | 0.4429 | 0.4441 |
| 1.6 | 0.4452 | 0.4463 | 0.4474 | 0.4484 | 0.4495 | 0.4505 | 0.4515 | 0.4525 | 0.4535 | 0.4545 |
| 1.7 | 0.4554 | 0.4564 | 0.4573 | 0.4582 | 0.4591 | 0.4599 | 0.4608 | 0.4616 | 0.4625 | 0.4633 |
| 1.8 | 0.4641 | 0.4649 | 0.4656 | 0.4664 | 0.4671 | 0.4678 | 0.4686 | 0.4693 | 0.4699 | 0.4706 |
| 1.9 | 0.4713 | 0.4719 | 0.4726 | 0.4732 | 0.4738 | 0.4744 | 0.4750 | 0.4756 | 0.4761 | 0.4767 |
| 2.0 | 0.4772 | 0.4778 | 0.4783 | 0.4788 | 0.4793 | 0.4798 | 0.4803 | 0.4808 | 0.4812 | 0.4817 |
| 2.1 | 0.4821 | 0.4826 | 0.4830 | 0.4834 | 0.4838 | 0.4842 | 0.4846 | 0.4850 | 0.4854 | 0.4857 |
| 2.2 | 0.4861 | 0.4864 | 0.4868 | 0.4871 | 0.4875 | 0.4878 | 0.4881 | 0.4884 | 0.4887 | 0.4890 |
| 2.3 | 0.4893 | 0.4896 | 0.4898 | 0.4901 | 0.4904 | 0.4906 | 0.4909 | 0.4911 | 0.4913 | 0.4916 |
| 2.4 | 0.4918 | 0.4920 | 0.4922 | 0.4925 | 0.4927 | 0.4929 | 0.4931 | 0.4932 | 0.4934 | 0.4936 |
| 2.5 | 0.4938 | 0.4940 | 0.4941 | 0.4943 | 0.4945 | 0.4946 | 0.4948 | 0.4949 | 0.4951 | 0.4952 |
| 2.6 | 0.4953 | 0.4955 | 0.4956 | 0.4957 | 0.4959 | 0.4960 | 0.4961 | 0.4962 | 0.4963 | 0.4964 |
| 2.7 | 0.4965 | 0.4966 | 0.4967 | 0.4968 | 0.4969 | 0.4970 | 0.4971 | 0.4972 | 0.4973 | 0.4974 |
| 2.8 | 0.4974 | 0.4975 | 0.4976 | 0.4977 | 0.4977 | 0.4978 | 0.4979 | 0.4979 | 0.4980 | 0.4981 |
| 2.9 | 0.4981 | 0.4982 | 0.4982 | 0.4983 | 0.4984 | 0.4984 | 0.4985 | 0.4985 | 0.4986 | 0.4986 |
| 3.0 | 0.49865 | 0.49869 | 0.49874 | 0.49878 | 0.49882 | 0.49886 | 0.49889 | 0.49893 | 0.49896 | 0.49900 |
| 3.1 | 0.49903 | 0.49906 | 0.49910 | 0.49913 | 0.49916 | 0.49918 | 0.49921 | 0.49924 | 0.49926 | 0.49929 |
| 3.2 | 0.49931 | 0.49934 | 0.49936 | 0.49938 | 0.49940 | 0.49942 | 0.49944 | 0.49946 | 0.49948 | 0.49950 |
| 3.3 | 0.49952 | 0.49953 | 0.49955 | 0.49957 | 0.49958 | 0.49960 | 0.49961 | 0.49962 | 0.49964 | 0.49965 |
| 3.4 | 0.49966 | 0.49968 | 0.49969 | 0.49970 | 0.49971 | 0.49972 | 0.49973 | 0.49974 | 0.49975 | 0.49976 |
| 3.5 | 0.49977 | 0.49978 | 0.49978 | 0.49979 | 0.49980 | 0.49981 | 0.49981 | 0.49982 | 0.49983 | 0.49983 |