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**University Examinations 2016/2017**

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN STATISTICS, BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE

**SMS 3213: INTRODUCTION TO COMPUTER INTERACTIVE STATISTICS**

**DATE: DECEMBER, 2016 TIME: 2 HOURS**

**INSTRUCTIONS: -** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Explain the recent development in statistics (4 marks)
2. Briefly explain the procedure for writing a statistical report. (4 marks)
3. Given that  is a sequence of random sample with the same distribution with mean and variance , show that the sampling distribution of  is a random variable having mean and standard deviation  (4 marks)
4. Construct a confidence interval (CI) for the parameter used to estimate the error when the variable is known. (4 marks)
5. A random sample of size 80 is taken from a population. Given that  and , construct a 99% confidence interval for the population mean . (3 marks)
6. The table below shows an spss output when comparing the mean of a given data.

|  |  |
| --- | --- |
|  y | One sample statistics |
| N | Mean  | Std. deviation | Std. error |
| 467 | 61.9067 | 14.7387 | 0.68203 |

|  |  |
| --- | --- |
|  | One sample test |
|  | Test value =50 |
|  | t | df | P value | Mean difference | 95% CI of difference |
|  |  |  |  |  | Lower upper  |
| x | 17.458 | 466 | 0.000 | 11.90667 | 10.5664 13.2469 |

 Interpret the results in this output. (5 marks)

1. Let  for  be a sample from a normal distribution with unknown mean and unknown variance . Construct a confidence interval for  by using the fact that  (3 marks)
2. Test the null hypothesis



Vs



With a standard deviation 0.01 at 0.05 level of significance if a sample of size 35 with a mean of 0.343 is tested. (3 marks)

**QUESTION TWO (20 MARKS)**

1. A population is normally distributed with a mean 7 and standard deviation 2. How big should the sample be if at 95% confidence interval the size of  is 0.03? (5 marks)
2. A trucking firm suspects the claim that the average lifetime of certain tyres is at least 28,000 miles. To check the claim, the firm puts 40 of these tyres on its trucks and gets them mean lifetime of 27463 miles with standard deviation of 1,343 miles. What is the conclusion of the firm if the probability of type 1 error is to be at most 0.01? (4 marks)
3. Let for be any sample of a normal population. Suppose that we are interested in testing the null hypothesis



Vs



At level , determine the acceptance region for the mean when

1. Variable is known (4 marks)
2. Variance is unknown (4 marks)
3. In 64 randomly selected hours of production, the mean and the standard deviation of the number of acceptance prices produced by an automatic stamping machine are 1038 and 46 respectively. At 0.05 level of significance, does this enable us to reject the null hypothesis

vs  (3 marks)

**QUESTION THREE (20 MARKS)**

1. Define the following terms
2. Producers risk (2 marks)
3. Consumers risk (2 marks)
4. Two detergents are tested for their ability to remove stain of a certain type. An inspector judged the first one to be successful in 63 out of 91 independent trials, and the second one to be successful in 42 out of 79 trials. Construct 95% confidence interval for the true proportion of difference of the ability of the detergent to remove stains of a certain type. (4 marks)
5. Let  for be the number of items out of  items that meet certain standards. Consider the random variable  for large  and .
6. Show that  and  (10 marks)
7. Construct the confidence interval for  where  is a binomial random variable with parameters  and . (6 marks)

**QUESTION FOUR (20 MARKS)**

1. Describe the SPSS environment. (10 marks)
2. From a given data, the following output was obtained using excel spreadsheet.

Summary output

Regression statistics

Multiple R 0.0015641

R square 2.4464E.06

Adjusted R square -2.101E-0.5

Standard error 2.57556368

Observations 42629

|  |  |
| --- | --- |
|  | df ss ms F significance |
| Regression  | 1 0.691762 0.691762 0.104203 0.74675108 |
| Resident  | 42627 287767.4 6.633528 |

 42628 282768.1

|  |  |
| --- | --- |
|  | coefficient std error t-stats p-value  |
| intercept | 0.00610528 0.053576 112.1046 0 |
| Available 1 | -0.0002631 0.000815 -0.32293 0.746751 |

1. Briefly explain the steps followed to arrive to such an output using Excel Spreadsheet. (5 marks)
2. Write the correct model form this output describing the behaviour of the given data. (2 marks)
3. Interpret the model (3 marks)

**QUESTION FIVE (20 MARKS)**

1. Briefly describe four steps followed in constructing a confidence interval. (4 marks)
2. Suppose we want to estimate the average weight of an adult male in Meru County. Let us draw a random sample of 1000 men from a population of 1,000,000 men and weigh them. If we find that the average man in our sample weighs 180 pounds, and that the standard deviation of the sample is 30 pounds, what is the 95% confidence interval? (8 marks)
3. Briefly explain five aims of data exploratory analysis. (5 marks)
4. State the conditions under which binomial distribution is used. (3 marks)