Vavuniya Campus of the University of Jaffna

First Examination in Information Communication Technology - 2017

Second Semester March/April-2019

TICT1242 Fundamentals of Statistics

Answer Four Questions Only

Time Allowed: Two Hours

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1. (a) Distinguish between descriptive statistics and inferential statistics. [20%]

   (b) Define each of the following terms.

   i. Probability

   ii. Sample

   iii. Population

   iv. Random variable

   v. Correlation [50%]

   (c) Bag A contains 2 white color balls and 3 red color balls and the bag B contains 4 white color balls and 5 black color balls . One bag is randomly selected and a ball is drawn from it. Drawn ball is observed to be white color ball. Find the probability that the drawn white color ball is from bag B. [30%]

2. (a) A quiz consists of 10 multiple-choice questions. Each question has 5 possible answers, only one of which is correct. Bandara plans to guess the answer to each question.

   i. Find the probability that Bandara gets one answer is correct. [20%]

   ii. Find the probability that Bandara gets all 10 answers are correct. [20%]

   iii. Find the probability that Bandara gets at least 6 answers are correct. [15%]

   (b) From a census data for a particular income group, 10% of households have no children, 25% have one child, 50% have two children, 10% have three children and 5% have four children. If x represents the number of children per household for the given income group then the probability distribution of x is given in the following table:

x	0	1	2	3	4
P(x)	0.1	0.25	0.5	0.1	0.05

   i. Find the probability that a household has at least two children. [15%]

   ii. Find the probability that a household has children between one and three inclusive. [15%]

   iii. Find the probability that a household has at most one child. [15%]

3. The following table lists the marks obtained by 30 students in an In-Course Assessment examination:

69	40	32	74	54	47	80	25	60	69
44	67	72	35	51	82	46	20	66	27
50	70	38	85	66	81	30	68	42	78

   (a) Compute the sample mean, variance and standard deviation of the marks. [40%]

   (b) Estimate the standard error of the sample mean. [10%]

   (c) Compute the inter quartile range (IQR). [15%]

   (d) Check for outliers using the 1.5 (IQR) rule. [15%]

   (e) Compute the five-point summary and construct a box-plot. [20%]

4. The following data represent the number of hours spend on watching television during the weekend by 6 different students and the marks obtained by each of them in a test on the following Monday.

Hours (x)	0	1	2	3	4	5
Test marks (y)	96	85	82	74	95	68

(a) Display the scatter plot. [10%]

(b) Calculate the correlation coefficient r. [15%]

(c) Estimate the linear regression equation predicting y based on x. [20%]

(d) Predict the test score when hours is equal to 6. [10%]

(e) Complete the ANOVA table. [20%]

(f) What portion of the total variation of y is explained by variable x ? [10%]

(g) Comment on the significance of the fitted model using F-test. [15%]

5. Let continuous random variable X denote the current measured in a thin copper wire in milliamperes.

(a) Assume that the range of X is $[0, 20\ mA]$, and assume that the probability density function of x is $f(x) = 0.05,\ 0 \leq x \leq 20$.

i. What is the probability that measurement of current is between 5 and 10 milliamperes? [25%]

ii. Compute the mean and standard deviation of x. [25%]

(b) Assume that measurements follow a normal distribution with a mean of 10 milliamperes and a variance of 4 (milliamperes)^2. [25%]

i. What is the probability that measurement will exceed 13 milliamperes?

ii. What is the probability that measurement of current is between 9 and 11 milliamperes? [25%]