

INSTRUCTION: Answer all questions in SECTION A in the space(s) provided and any two questions in SECTION B. Write your Registration number and Department clearly

Old Val
n-half

- 1 List 4 reasons for statistical sampling
 (i) Limited Resources (ii) Destructive testing
 (iii) Scarcity (iv) speed and Accuracy.

- 2 List 6 methods of data collection
 (i) Observation (ii) Questionnaire (iii) experimental results
 (iv) Telephone Interview (v) personal Interview (vi) Registration

List 4 properties of a good estimator: (i) Efficiency (ii) Sufficiency (iii) Unbiasness
 (iv) consistency

Consistency
 Estimated
 Efficiency
 Sufficiency

Let X be a binomially distributed random variable based on 8 repetition of an experiment. (i) State the probability mass function (pmf) of X. (ii) If $p=0.4$, find $P(X>5)$.

$L = 0.89706$
 $U = 0.9294$

A drug manufacturer claims his drug is effective in curing a particular type of disease. The drug given to 400 persons saw 360 recovering from the disease (i) Obtain the estimate of the proportion p recovering. (ii) Obtain the 95% confidence interval of proportion p. In Chi-square test, we compare the (i) Observed and (ii) expected frequencies

SECTION B (THEORY)

- 7 The frequency distribution for the systolic blood pressure reading (mmHg) of 120 randomly selected EBSU students is shown below, find the (i) mean; (ii) median; (iii) third quartile, and (iv) 70th percentile

Class
80 - 94
95 - 109
110 - 124
125 - 139
140 - 154
155 - 169

$\frac{\sum x}{n} = \frac{\sum fx}{n}$

$B = \frac{\sum fx - AF}{n}$

Frequency
13
21
17
30
23
16

$C = \frac{\sum x^2}{n} - \frac{(\sum x)^2}{n^2}$

$P \pm 2 \times 1.96 \sqrt{\frac{PC}{n}}$

$B_1 = \frac{\sum fx}{n}$

EBONYI STATE UNIVERSITY, ABAKALIKI
FACULTY OF SCIENCE
DEPARTMENT OF INDUSTRIAL MATHEMATICS/APPLIED STATISTICS
FIRST SEMESTER EXAMINATION 2018/2019 SESSION
STA 201: STATISTICS FOR APPLIED SCIENCES **TIME: 90 MINUTES**

Reg. No. Dept. Signature:

INSTRUCTION: Fill in the answers in the space(s) provided. Don't use any other answer script. Write your Reg. No, Dept. and signature **clearly** on every page of this paper. Answer all questions

1. Two properties of probability density function(pdf) are:
 - (i) _____
 - (ii) _____

2. If the pdf of a random variable X is given by $f(x) = 3x^2$ for $0 \leq x \leq 1$, find the (i) expected value of X _____ (ii) variance of X _____

3. List 4 properties of a good estimator (i).....(ii).....(iii).....
 (iv).....

4. Let X be a binomially distributed random variable based on 8 repetition of an experiment. (i) State the probability mass function (pmf) of X..... (ii) If $p=0.4$, find $P(X>5)$

5. If the random variable X follows a normal distribution with mean, μ and variance, σ^2 . State the pdf of X _____

6. Let X be a normally distributed random variable with mean $\mu = 15$ and variance, $\sigma^2 = 9$, find $P[X < 18]$

7. Assuming random samples taken from a population with variance gave the following data: $n = 16$; $\bar{X} = 30$; $\sigma^2 = 16$ and $\alpha = 5\%$. The confidence interval is _____

8. Given that the degree of freedom (d.f) of a random sample is 14 at 1% α level of significance using student's t - distribution table find $\frac{t_{0.01}}{2}, (14)$ _____

9. Consider the following measurements

X	14	16	22	15	20
Y	12	10	11	8	9

 - (i) The regression equation of y on x is
 - (ii) The value of y when $x = 26$ is
 - (iii) State the formula for Spearman's correlation coefficient of X and Y.....
 - (iv) find the Spearman's correlation coefficient between X and Y _____

10. Suppose 3% of items made by a shoe factory are defective. Given that $\lambda=3$, find the probability that there are two defective items.
11. A drug manufacturer claims his drug is effective in curing a particular type of disease. The drug given to 400 persons saw 360 recovering from the disease (i) Obtain the estimate of the proportion p recovering.....(ii) Obtain the 95% confidence interval of proportion p
12. In Chi-square test, we compare the (i).....and (ii)..... frequencies
13. A class consists of 5 girls and 10 boys. If a committee of 5 is chosen at random from the class, find the probability that : (i) 3 boys are selected.....(ii) at least one girl is selected.....
14. (i) State mathematical model for one-way analysis of variance (ANOVA).....(ii) List 3 assumptions of ANOVA.....
15. The frequency distribution for the systolic blood pressure reading (mmHg) of 120 randomly selected EBSU students is shown below, find the (i) mean.....(ii) median.....(iii) third quartile..... (iv) 74th percentile.....

Class	Frequency
80 - 94	13
95 - 109	18
110 - 124	17
125 - 139	33
140 - 154	23
155 - 169	16

16. A study was conducted to determine whether there is a relationship between jogging and blood pressure. Random samples of 220 subjects were selected. Given the following contingency table

		Blood pressure		
		Low	Moderate	High
Jogging Status	Joggers	30	70	24
	Non-joggers	27	50	19

Using the information above and $\alpha = 5\%$, find the values for the following:

- (i) $\chi^2_{(r-1)(c-1), \alpha} =$ _____ (ii) E_{11} _____
- (iii) E_{12} _____ (iv) E_{21} _____
- (v) E_{22} _____

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 [Redacted]
 [Redacted] SCIENCE, 200LV

EBONYI STATE UNIVERSITY, ABAKALIKI
FACULTY OF SCIENCE
DEPARTMENT OF INDUSTRIAL MATHEMATICS/APPLIED STATISTICS
FIRST MID-SEMESTER EXAMINATION 2019/2020 SESSION (15%)
STA 201: STATISTICS FOR APPLIED SCIENCES **TIME: 40 minutes**
INSTRUCTION: Answers all questions. Write your Name; Registration number and Department clearly

- List 4 properties of a good estimator (i) Consistency, (ii) Sufficiency, (iii) Efficiency, (iv) Unbiasedness
- Let X be a binomially distributed random variable based on 8 repetition of an experiment. (i) State the probability mass function (pmf) of X _____ (ii) If $p=0.4$, find $P(X>5)$ _____
- A drug manufacturer claims his drug is effective in curing a particular type of disease. The drug given to 400 persons saw 360 recovering from the disease (i) Obtain the estimate of the proportion p recovering _____ (ii) Obtain the 95% confidence interval of proportion p _____
- A class consists of 5 girls and 10 boys. If a committee of 5 is chosen at random from the class, find the probability that: (i) 3 boys are selected 0 (ii) at least one girl is selected 1
- (i) State a mathematical model for a simple linear regression $y_i = \beta_0 + \beta_1 X_i + \epsilon_i$
- The frequency distribution for the systolic blood pressure reading (mmHg) of 120 randomly selected EBSU students is shown below, find the (i) mean; (ii) median; (iii) third quartile, and (iv) 74th percentile.

Class	Frequency	Σx	Σfx
80 - 94	13	87	1131
95 - 109	18	102	1836
110 - 124	17	117	1989
125 - 139	33	132	4356
140 - 154	23	147	3381
155 - 169	16	162	2592
	<u>120</u>		<u>15285</u>
	<u>Σf</u>		<u>Σfx</u>

Final answer
 (i) Mean = 127.38
 (ii) Median = 144.04
 (iii) Third quartile = 145.36
 (iv) 74th percentile = 144.509
 P.T.O for answer.

7. Consider the following measurements

X	14	16	22	15	20
Y	12	10	11	8	9

- The regression equation of y on x is;
 - The value of y when x = 26
- i) $\hat{y} = 0$
 ii) $\hat{Y} = 10 + 0X$ $\hat{Y} = 10 + 0(26) = 10 + 0 = 10$
 $\therefore \hat{Y} = 10$

EBONYI STATE UNIVERSITY ABAKALIKI

FACULTY OF SCIENCE

DEPARTMENT OF INDUSTRIAL MATHEMATICS/STATISTICS

STATISTICS FOR APPLIED SCIENCES 1 STA 201

INSTRUCTION: ANSWER ALL QUESTIONS

TIME ALLOWED 2HOURS

1i. If A and B are mutually exclusive events, then $P(A \text{ or } B)$ equals _____

ii. List four properties of a good estimator _____

2. Let X be a binomially distributed random variable, based on n repetitions of an experiments, if P is the probability of success (i) State the probability mass function (pmf) of X _____

(ii) If $n=6$, and $p=0.5$. Find $P(x < 4)$ _____

3. Assuming the random samples taken from a population gave the following data $n=16$ $\bar{X}=30$ $S^2=16$. The confidence interval at $\alpha = 5\%$ is given by _____

4. A manufacturer of a certain transistor claims that the parts used for his production are non-defective. In a random sample of 160 transistors, only 140 are non-defective.

i. Obtain the estimate of the proportion P of non-defective transistors _____

ii. Obtain the 95% Confidence interval for the proportion P _____

5. State a mathematical model for a simple linear regression _____

6. List two methods of finding an estimator of a population parameter

(i) _____ (ii) _____

7. Two well-known hypothesis are:

(i) _____ (ii) _____

8. Class interval Frequency

57 - 66 13

67 - 76 18

77 - 86 26

87 - 96 20

97 - 106 36

107 - 116 18

117 - 126 4

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STA 201: STATISTICS FOR APPLIED SCIENCES **TIME: 90 minutes**

INSTRUCTION: Answers all questions in SECTION A in the space(s) provided and any two questions in SECTION B. Write your Registration number and Department clearly

- 1 List 4 reasons for statistical sampling
 (i) _____ (ii) _____
 (iii) _____ (iv) _____
- 2 List 6 methods of data collection
 (i) _____ (ii) _____ (iii) _____
 (iv) _____ (v) _____ (vi) _____
- 3 List 4 properties of a good estimator: (i) _____, (ii) _____, (iii) _____
 (iv) _____
- 4 Let X be a binomially distributed random variable based on 8 repetition of an experiment. (i) State the probability mass function (pmf) of X (ii) If $p=0.4$, find $P(X>5)$
- 5 A drug manufacturer claims his drug is effective in curing a particular type of disease. The drug given to 400 persons saw 360 recovering from the disease (i) Obtain the estimate of the proportion p recovering.....(ii) Obtain the 95% confidence interval of proportion p
- 6 In Chi-square test, we compare the (i).....:.....and (ii)..... frequencies

SECTION B (THEORY)

- 7 The frequency distribution for the systolic blood pressure reading (mmHg) of 120 randomly selected EBSU students is shown below, find the (i) mean; (ii) median; (iii) third quartile, and (iv) 70th percentile

Class	Frequency
80 - 94	13
95 - 109	21
110 - 124	17
125 - 139	30
140 - 154	23
155 - 169	16

0.0005
0.05

χ^2 xy x^2 y^2
 $\frac{R_i \times C_i}{N}$

8. A study was conducted to determine whether there is a relationship between jogging and blood pressure. Random samples of 210 subjects were selected. Given the following contingency table

Jogging Status	Blood pressure			total
	Low	Moderate	High	
loggers	30 E_{11}	60 E_{12}	24 E_{13}	114
Non-loggers	27 E_{21}	50 E_{22}	19 E_{23}	96
total	57	110	43	210

$\chi \frac{5}{100} = 0.05 = 5.99$

Using the information above and $\alpha = 5\%$, find the values for the following:

- (i) $\chi^2_{(r-1)(c-1), \alpha}$; (ii) $E_{11} = \frac{114 \times 57}{210} = 30.9$
- (iii) E_{12} ; (iv) E_{21} ; $E_{12} = \frac{114 \times 110}{210} = 59.7$
- (v) $E_{22} = \frac{96 \times 57}{210} = 26.1$

$\frac{96 \times 110}{210} = 50.3$ Spearman's formula
 $r = \frac{1 - 6 \sum d_i^2}{n(n^2 - 1)}$

9. Consider the following measurements

X	14	16	22	15	20
Y	12	10	11	8	9

- (i) The regression equation of y on x is;
- (ii) The value of y when x = 26;
- (iii) State the formula for Spearman's correlation coefficient of X and Y; (iv) find the Spearman's correlation coefficient between X and Y

for $z_c = P \pm \frac{2 \alpha / 2 \sqrt{P(1-P)}}{n}$
 $2 \alpha / 2 = 1.96$

x y xy x^2 y^2

$P(A) + P(B)$ mutually

- 8 A study was conducted to determine whether there is a relationship between jogging and blood pressure. Random samples of 210 subjects were selected. Given the following contingency table

		Blood pressure		
		Low	Moderate	High
Joggers		30	60	24
Non-joggers		27	50	19

Using the information above and $\alpha = 5\%$, find the values for the following:

- (i) $X^2_{(r-1)(c-1), \alpha}$; (ii) E_{11}
 (iii) E_{12} ; (iv) E_{21}
 (v) E_{22}

- 9 Consider the following measurements

X	14	16	22	15	20
Y	12	10	11	8	9

- (i) The regression equation of y on x is;
 (ii) The value of y when $x = 26$;
 (iii) State the formula for Spearman's correlation coefficient of X and Y; (iv) find the Spearman's correlation coefficient between X and Y

