UNIVERSITY OF COLOMBO, SRI LANKA

FACULTY OF ARTS

SECOND YEAR EXAMINATION IN ARTS (ONLINE), SEMESTER II - 2019/2020

GYG 2217 -STATISTICS

OPEN BOOK EXAMINATION

Instructions to Students:

- The question paper starts on page 2
- All written assessments must be **handwritten**. Handwriting must be **clear and readable**.
- Answers should be written on an **A4 size paper** (ruled/lined paper/or otherwise), using **a black ball point pen.**
- As is the case of an in-person examination, word processing or type setting of answers will not be permitted. This rule does not apply to any candidate who has been exempted by the University under applicable bylaws (e.g., due to visual impairment).
- The **index number must be written on the top right-hand side** of each page of the answer script. Do not write your name anywhere on the answer script.
- **Number the pages** of the answer script using the following format at the **bottom of the page**: E.g., if it consists of 5 pages 1/5, 2/5…etc.
- Use the **common front page** (provided on LMS) as the first page of the answer script. You may print, or hand write the front page which must be the first page of your assessment.
- The **total number of pages** should be indicated on the front page of the answer script.
- **Scan/take photos of the answer script and convert it to a single PDF file** in the order of the page numbers.
- The full page of the answer script must be properly covered in the scanned image, and the scanned image must be clear/readable.
- LMS does not permit individual pages to be uploaded separately.
- **The only acceptable file format is PDF. The PDF file should be named with your index number**, e.g. A 12345
- Uploading answer scripts as JPEG/JPG or any other form will not be permitted.
- Complete and upload the final version of the answer script to LMS **within the stipulated 24 hours.**
- Once the answer script has been uploaded to LMS, take **a screen shot of the full page** of the LMS with the word 'submitted', as an acknowledgement and keep with you.
- **If** there is an **unexpected technical issue** with the uploading of an answer script to LMS, you may send your answer script via email to exam2@arts.cmb.ac.lk within the stipulated 24-hour period.

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Duration: **24 hours** for completion and submission of answer scripts to LMS.
Answer **3** questions only

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1. (a) What is Descriptive Statistics?

(02 marks)

(b) Explain differences between Data and Information with examples.

(04 marks)

(c) The following is the number of minutes that 25 people exercised per week.

108	139	120	123	120	132	123	131	131	157	150
124	111	101	135	119	116	117	127	128	139	119
118	114	127								

(i) Prepare a frequency distribution table with five classes (100 – 112, 112 – 124 …) including class interval, frequency, mid value, cumulative frequency, and relative cumulative frequency.

(06 marks)

(ii) Create a histogram, frequency polygon and Orgive using the table you prepared in (i).

(06 marks)

(iii) Interpret your results.

(02 marks)

(Total 20 marks)

2. (a) Define Mean, Median, Mode and Standard Deviation

(04 marks)

(b) What are the differences between Measures of Central Tendency and Measures of Variability?

(04 marks)

(c) The marks of 20 students in the Statistics Examination are as follows.

30	21	15	14	10	19	14	22	27	30	20
18	23	15	16	16	15	29	28	13		

(i) Calculate the sample mean, median and mode.

(03 marks)

(ii) Calculate the sample standard deviation.

(03 marks)

(iv) Find the quartiles

(03 marks)

(iv) Draw a boxplot for the above data set.

(03 marks)

(Total 20 marks)

3. (a) What is Chi-square Test

(02 marks)

(b) What are the differences between goodness-of-fit test and contingency table test?

(04 marks)

(c) The number of yeast cells calculated on a hemocytometer relative to the theoretical value is as follows. Does the experimental result support the theory?

No. of Yeast cells in the square	Observed Frequency	Expected Frequency
0	103	106
1	143	141
2	98	93
3	42	41
4	8	14
5	6	5

(06 marks)

(d) The severity of a disease and blood group were studied in a research project. The findings are given in the following table. Can there be a correlation between the severity of the disease and the blood group?

Severity of disease	Blood Group				
	O	A	B	AB	Total
Severe	51	40	10	9	110
Moderate	105	103	25	17	250
Mild	384	527	125	104	1140
Total	540	670	160	130	1500

(08marks)

(Total 20 marks)

4. (a) What is Testing Hypotheses?

(02 marks)

(b) What are the differences between One Sample Test and Two Sample Test?

(04 marks)

(c) A random sample of 20 cows was selected from a large dairy Farm. The milk yield in one week was recorded, in kilograms, for each cow. The results are given below.

179.6 152.0 113.3 121.6 133.4 152.5 165.1 111.7 170.7 123.2
140.9 156.1 170.3 165.5 155.1 101.7 170.7 113.2 130.9 146.1

At the $\alpha = 0.05$ significance level, test the claim that the mean weekly milk yield is greater than 130 kg.

(06 marks)

(d) The following statistics assignment marks from the second-year students are following. At the $\alpha = 0.05$ significance level, test mean is equal 60.

61	65	67	62	50	87	66	60	64	64	62
61	51	64	55	56	60	57	68	56	62	70
51	72	66	63	55	62	75	63	61	60	69
59	90	91								

(08 marks)

(Total 20 marks)

5. Age of person in years and low density lipoproteins (LDL) cholesterol in mg/dl shows following table.

Age	48	36	52	57	35	34	48	68	47	58	60	60	50	65
LDL	121	102	145	154	104	102	129	208	145	128	175	183	166	190

(a) Draw a scatter diagram.

(03 marks)

(b) Calculate the regression equation.

(06 marks)

(c) Draw the regression line on your scatter diagram.

(01 marks)

(d) Calculate the correlation coefficient (r) between age and LDL.

(06 marks)

(e) Test the level of significance at 0.05 and interpret the correlation coefficient (r) value.

(04 marks)

(Total 20 marks)

Normal distribution

Percentage Points of the Normal Distribution	
P	**Z**
90%	0.1257
80%	0.2533
70%	0.3853
60%	0.5244
50%	0.6745
40%	0.8416
30%	1.0364
20%	1.2816
10%	1.6449
5%	1.96
2%	2.3263
1%	2.5758
0.20%	3.0902
0.10%	3.2905

Critical values of the Chi-square distribution with *d* degrees of freedom

	Probability of exceeding the critical value						
d	0.05	0.01	0.001	*d*	0.05	0.01	0.001
1	3.841	6.635	10.828	11	19.675	24.725	31.264
2	5.991	9.210	13.816	12	21.026	26.217	32.910
3	7.815	11.345	16.266	13	22.362	27.688	34.528
4	9.488	13.277	18.467	14	23.685	29.141	36.123
5	11.070	15.086	20.515	15	24.996	30.578	37.697
6	12.592	16.812	22.458	16	26.296	32.000	39.252
7	14.067	18.475	24.322	17	27.587	33.409	40.790
8	15.507	20.090	26.125	18	28.869	34.805	42.312
9	16.919	21.666	27.877	19	30.144	36.191	43.820
10	18.307	23.209	29.588	20	31.410	37.566	45.315

INTRODUCTION TO POPULATION GENETICS, Table D.1

The Students t Distribution						
Distribution of t for given probability Levels						
df	*Level of significance for one-tailed test*					
	0.1	0.05	0.025	0.01	0.005	0.0005
	Level of significance for two-tailed test					
	0.2	0.1	0.05	0.02	0.01	0.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.92	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.61
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.44	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.86	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.25	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.35	1.771	2.16	2.65	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.14
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.12	2.583	2.921	4.015
17	1.333	1.74	2.11	2.567	2.898	3.965
18	1.33	1.734	2.101	2.552	2.878	3.992
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.85

The Students t Distribution						
Distribution of t for given probability Levels						
df	*Level of significance for one-tailed test*					
	0.1	0.05	0.025	0.01	0.005	0.0005
	Level of significance for two-tailed test					
	0.2	0.1	0.05	0.02	0.01	0.001
21	1.323	1.721	2.08	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.5	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.06	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.69
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.31	1.697	2.042	2.457	2.75	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2	2.39	2.66	3.46
120	1.289	1.658	1.98	2.358	2.617	3.373
∞	1.282	1.645	1.96	2.326	2.576	3.291