University of Colombo, Sri Lanka

Faculty of Arts

Second Year Examination in Arts, Part I – 2017 / 2018

Second Semester, Final Examination

GYG 2217 – Statistics

(Time : 2 Hours)

Answer **three** questions only

Graph papers will be provided. Use of calculator is allowed

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1. (a) What is Statistics?

(01 marks)

(b) Explain the differences between Descriptive Statistics and Inferential Statistics.

(04 marks)

(c) Write brief notes using suitable examples followings.

(i) Population

(ii) Sample

(iii) Data

(iv) Variable

(v) Nominal Scale

(15 marks)

(Total 20 marks)

2. (a) Define the mean, median and mode.

(03 marks)

(b) The following shows the monthly stream flow data (ft3/s) for a river.

0.61 0.48 0.35 1.34 1.26 0.62 1.15 0.46 0.27 0.75 0.40 0.38

Find their (1) Mean (2) Median (3) Mode (4) Range (5) Variance (6) Standard deviation

(06 marks)

(c) A group of students are using a database of earthquakes to investigate times between the occurrences of serious earthquakes around the world. The following table, showing the

number of earthquakes for which the time interval from previous earthquakes is as shown.

Time in days from previous earthquakes	Number of earthquakes
0 – 100	31
100 – 200	24
200 – 300	12
300 – 400	14
400 – 500	8
500 – 600	7
600 – 700	5
700 – 800	6
800 – 900	5
900 – 1000	3

Create a suitable graphical representation of the distribution

(08 marks)

(d) The marks obtained by 50 students in a IQ test are given below. Find the average marks.

Marks	15	20	22	24	25	30	33	38	45
Frequency	3	4	5	10	11	9	5	2	1

(03 marks)

(Total 20 marks)

3. (a) What is the significant test?

(02 marks)

(b) What are the difference between critical value and critical region?

(02 marks)

(c) Rahima's Bakery produces 400-gram unwrapped loaves of bread. As part of a check on the quality of the loaves, samples of 25 loaves are randomly selected. Information is as follows.

383 385 385 387 394 397 398 402 405 406 406 408 409 410 411 412 413 413 414 415 415 416 416 417 418

Test a 98% confidence interval for the mean weight of 400-gram loaves produced by Rahima's Bakery.

(10 marks)

(d) A light bulb manufacturer guarantees that the mean life of a certain type of light bulb is at least 750 hours. A random sample of 36 light bulbs has a mean life of 745 hours with a standard deviation of 60 hours. Do you have enough evidence to reject the manufacturer's claim? Use $\alpha = 0.05$.

(06 marks)

(Total 20 marks)

4. How strong is the linear relationship between the age of a driver and the distance the driver can see? A research firm collected data on a sample of $n = 12$ drivers.

Age (years)	18	20	22	23	23	25	27	28	29	32	37	41
Distance (meters)	510	590	560	510	460	490	560	510	460	410	420	460

(a) Draw a scatter diagram of these data.

(03 marks)

(b) Find the regression equation.

(08 marks)

(c) Estimate the distance of a driver can the seen whose age is 45 years.

(02 marks)

(d) Find the coefficient of determination and the coefficient of correlation

(02 marks)

(e) Test the hypothesis: ***H1; $\beta < 0$, using $\alpha = 0.05$***

(05 marks)

(Total 20 marks)

5. (a) Briefly discus following components of a time series analysis.

(i) Trend

(ii) Cyclical Variation

(iii) Seasonal Variation

(iv) Random Variation

(04 marks)

(b) The arrivals to Sri Lanka at the air-port Colombo recorded for three years are given below.

(i) Calculate the trend values using the Least Squares method.

(08 marks)

(ii) Graph the trend line against the arrivals of Sri Lanka.

(03 marks)

(iii) Calculate the seasonal index for each month.

(05 marks)

(Total 20 marks)

The arrivals to Sri Lana at the Air-port Colombo (thousands) 2013 - 2015

Month	Year		
	2013	2014	2015
January	98	108	107
February	81	81	86
March	98	100	107
April	111	119	129
May	92	101	109
June	97	104	110
July	109	111	123
August	109	114	125
September	93	101	112
October	95	94	105
November	93	101	105
December	121	125	140

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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%	1.9600
2%	2.3263
1%	2.5758
0.2%	3.0902
0.1%	3.2905

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The Students t Distribution

Distribution of *t* for given probability Levels

df	*Level of significance for one-tailed test*					
	0.10	**0.05**	**0.025**	**0.01**	**0.005**	**0.0005**
	Level of significance for two-tailed test					
	0.20	**0.10**	**0.05**	**0.02**	**0.01**	**0.001**
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	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	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	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	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	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	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	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	3.850
21	1.323	1.721	2.080	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	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	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	3.690
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	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291