

**University of Colombo, Sri Lanka**  
**Faculty of Arts**  
**Second Year Examination in Arts, Part I – 2016/2017**  
**First Semester, Final Examination**  
**GYG 2117 – Statistics**  
**(Time : 2 Hours)**

Answer three questions only

Graph papers will be provided. Use of calculator is allowed

1. (i) Define the term “Statistics”.  
(02 marks)
- (ii) How is Descriptive Statistics varied from Inferential Statistics?  
(03 marks)
- (iii) Explain differences between following with examples.  
(a) Parameter and Statistic  
(b) Population and Sample  
(c) Data and Variable  
(d) Continuous Variable and Discrete Variable  
(e) Nominal Scale and Ordinal Scale  
(15 marks)
- (Total marks 20)
2. (i) What are the differences between Measures of Central Tendency and Measures of Variability.  
(02 marks)
- (ii) The heights in inches of 22 students are as follows:  
58, 58, 59, 60, 62, 64, 64, 65, 66, 66, 66, 66, 68, 68, 69, 70, 71, 72, 72, 74, 75, 77  
Calculate the Mean, Median, Mode and Standard Deviation.  
(06 marks)

- (iii) The marks obtained by 100 students in a statistical test are given below. Find the average mark.

Mark (X)	Frequency (F)
70	25
73	27
75	20
79	15
80	13
Total	100

(04 marks)

- (iv) The following are the weight obtained by 50 students in statistics class.  
Using the data, construct the Histogram and Frequency Polygon.

Weight (kg)	Frequency
20 - 30	10
30 - 40	12
40 - 50	15
50 - 60	8
60 - 70	5
Total	50

(08 marks)

(Total 20 marks)

3. (i) What is meant by Significance Test?

(02 marks)

- (ii) Explain difference between Null Hypothesis and Alternative hypothesis.

(03marks)

- (iii) Test the following hypotheses.

- (a)  $H_0: \mu = 30, H_1: \mu \neq 30, n = 25, \bar{x} = 30.2, \sigma = 1.8, \alpha = 0.05$   
(b)  $H_0: \mu = 100, H_1: \mu < 100, n = 40, \bar{x} = 98.5, \sigma = 4.0, \alpha = 0.05$   
(c)  $H_0: \mu = 10, H_1: \mu \neq 10, n = 25, \bar{x} = 11.5, s = 3.0, \alpha = 0.05$   
(d)  $H_0: \mu = 20, H_1: \mu > 20, n = 50, \bar{x} = 18.5, s = 3.5, \alpha = 0.01$   
(e)  $H_0: \mu = 50, H_1: \mu \neq 50, n = 60, \bar{x} = 48.9, s = 4.0, \alpha = 0.01$

(15 marks)

(Total 20 marks)

4. Following table shows in kilograms the respective weights of 10 fathers and their eldest sons.

Weight of father (X)	70	68	72	69	73	67	75	71	73	72
Weight of son (Y)	73	71	73	70	74	71	73	70	76	72

- (i) Construct a scatter diagram. (05 marks)
- (ii) Find the regression equation. (08 marks)
- (iii) Compute the total variation, explained variation and unexplained variation. (05 marks)
- (iv) Estimate the weight of son of a father weight is 78. (02 marks)
- (Total 20 marks)

5. (i) What is the correlation coefficient? (02 marks)
- (ii) State the methods which used to calculate correlation coefficient methods. (02 marks)
- (iii) Following table shows assignment marks and final exam marks earned by 10 students for statistics.

Student	1	2	3	4	5	6	7	8	9	10
Assignment marks	75	88	90	60	50	77	79	72	67	85
Final exam marks	70	80	85	55	45	70	75	70	65	80

- (a) Find the correlation coefficient using any method. (08 marks)
- (b) Test the hypothesis:  $H_1: B_1 > 0$ , using  $\alpha = 0.05$ . (06 marks)
- (c) Interpret your results. (02 marks)
- (Total 20 marks)

6. (i) Briefly discuss the components of the time series analysis. (04 marks)
- (ii) The rainfall data recorded for three years are given below.
- (a) Calculate the trend values using the Least Squares method. (08 marks)
- (b) Draw the trend line on the rainfall data. (04 marks)
- (c) Calculate the seasonal index for each month. (04 marks)
- (Total 20 marks)

Month	Year		
	2014	2015	2016
January	3.94	4.66	7.91
February	0.70	8.92	10.06
March	11.33	3.66	11.47
April	17.27	16.33	19.16
May	17.35	38.89	20.62
June	25.48	9.22	14.12
July	17.16	1.06	18.43
August	4.69	12.56	8.27
September	20.04	11.08	13.85
October	17.53	21.81	26.43
November	18.78	8.67	9.60
December	11.23	22.26	10.11

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

The Students t Distribution

Distribution of *t* for given probability Levels

df	<i>Level of significance for one-tailed test</i>					
	0.10	0.05	0.025	0.01	0.005	0.0005
	<i>Level of significance for two-tailed test</i>					
	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
$\infty$	1.282	1.645	1.960	2.326	2.576	3.291