GEP 223: STATISTICAL GEOGRAPHY MAY 2013

SECTION A: COMPULSORY

QUESTION 1

Table 1 shows hypothetical ages and weights of Form 3 students at Swazi National High School.

(a) Calculate the Pearson's Product Moment and Spearman's Rank Correlation Co-efficients between ages and weight. (14 marks)

(b) Plot a scatter diagram and a regression line of the students' ages and weight (8marks)

(c) Comment on the results obtained in b) above. (4 marks)

(d) Test the correlation co-efficients at 0.01 significance level. (6 marks)

(e) Distinguish between Pearson Product Moment and Spearman Rank correlation methods as measures of relationships (8 marks)

(40 Marks)

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 2

The Swaziland Government has commissioned you to carry out a study on the 500 industries in Matsapa and evaluate their contribution to the national economic development of the country. Two hundred and fifty (250) of the industries are small scale, 100 are of the medium scale and 150 are of large scale. The available funds are sufficient to cover only 20% of the industries.

(a) Demonstrate clearly how you would choose a representative sample for this study. (15 marks)

(b) (i) Indicate the type of information you will need for this study. (5 marks)

(ii) Identify possible sources of relevant information (5 marks)

(iii) Identify the necessary instruments you will employ to get the information. (5 marks)

(30 Marks)

QUESTION 3

(a) Discuss the advantages and disadvantages of any three methods of obtaining primary data. (15 marks)

(b) What are the limitations of using secondary data? (10 marks)

(c) How would you minimise the limitations observed in (b) above? (5 marks)

(30 Marks)

QUESTION 4

Table 2 shows the sampled age of heads of households in Extension 5 (a formal settlement) and Mathendele (an informal settlement) in Nhlangano. The Null hypothesis (H_o) states that: There is no difference between means of the two settlements. The alternative hypothesis (H_1) states that: There is a difference between the means of the two settlements. The rejection level was set at 0.05.

(a) Calculate the student t-test to establish the difference between the two samples. (20 marks)

(b) Establish whether you are going to reject or accept H_o based on the results obtained in a) above. (10 marks)

(30 Marks)

QUESTION 5

Using specific examples explain the following types of data from each other.

(a) Interval and ratio data (6 marks)

(b) Nominal and ordinal data (6 marks)

(c) Primary and secondary data (6 marks)

(d) Discrete and continuous data (6 marks)

(e) Individual and grouped data (6 marks)

(30 Marks)

Table 1 Age and weight of Form 3 students at Swazi National High School

Student No.	Age (years)	Weight	Student No.	Age (years)	Weight
1.	20	59	16.	18	56
2.	17	51	17.	17	61
3.	18	62	18.	20	62
4.	17	54	19.	19	61
5.	19	65	20.	21	59
6.	22	66	21.	16	52
7.	21	60	22.	24	65
8.	17	66	23.	17	56
9.	23	68	24.	20	62
10.	20	63	25.	23	59
11.	21	59	26.	18	60
12.	22	59	27.	16	54
13.	19	57	28.	20	59
14.	21	58	29.	19	64
15.	18	63	30.	18	57

Source: Hypothetical

Table 2 Sampled heads of households at Extension 5 and Mathendele in Nhlangano

Mathendele (x)	Extension 5 (y)
39	35
51	40
53	53
46	29
57	32
43	48
48	28
50	42
38	47
47	38

Source: Hypothetical

C9 Critical Values of Spearman's Rank Correlation Coefficient r_s

Degrees of freedom	Significance level (one-tailed) 0.05	0.025	0.01	0.005
	Significance level (two-tailed) 0.1	0.05	0.02	0.01
4	1.000			
5	0.900	1.000	1.000	
6	0.829	0.886	0.943	1.000
7	0.714	0.786	0.893	0.929
8	0.643	0.738	0.833	0.881
9	0.600	0.683	0.783	0.833
10	0.564	0.648	0.745	0.794
11	0.523	0.623	0.736	0.818
12	0.497	0.591	0.703	0.780
13	0.475	0.566	0.673	0.745
14	0.457	0.545	0.646	0.716
15	0.441	0.525	0.623	0.689
16	0.425	0.507	0.601	0.666
17	0.412	0.490	0.582	0.645
18	0.399	0.476	0.564	0.625
19	0.388	0.462	0.549	0.608
20	0.377	0.450	0.534	0.591
21	0.368	0.438	0.521	0.576
22	0.359	0.428	0.508	0.562
23	0.351	0.418	0.496	0.549
24	0.343	0.409	0.485	0.537
25	0.336	0.400	0.475	0.526
26	0.329	0.392	0.465	0.515
27	0.323	0.385	0.456	0.505
28	0.317	0.377	0.448	0.496
29	0.311	0.370	0.440	0.487
30	0.305	0.364	0.432	0.478
35	0.282	0.336	0.399	0.442
40	0.263	0.314	0.373	0.413
45	0.248	0.296	0.351	0.388
50	0.235	0.280	0.332	0.368
55	0.224	0.267	0.317	0.351
60	0.214	0.255	0.303	0.335
65	0.206	0.245	0.291	0.322
70	0.198	0.236	0.280	0.310
75	0.191	0.228	0.271	0.300
80	0.185	0.221	0.262	0.290
85	0.180	0.214	0.254	0.281
90	0.174	0.208	0.247	0.273
95	0.170	0.202	0.240	0.266
100	0.165	0.197	0.234	0.259

Reject H_0 if calculated value of r_s is **greater than** the critical value at the chosen significance level (in absolute terms).

For degrees of freedom greater than 30 other critical values can be found from the following relationship:

$$r_s = z\sqrt{1/(n-1)}$$

where r_s is the critical value of r_s, n is the number of individuals in the data set (the degrees of freedom), and z is the appropriate critical value of a standard normal deviate (from Appendix C10). For a two-tailed test at the 0.01 level the appropriate value of z is 2.576, so the critical value of r_s with 72 degrees of freedom is:

$$\begin{aligned} 2.576\sqrt{1/(72-1)} &= 2.576\sqrt{0.014} \\ &= 2.576 \times 0.119 \\ &= 0.306 \end{aligned}$$

C10 Critical Values of a Standard Normal Deviate z

	Significance level (one-tailed) 0.1	0.05	0.01	0.005	0.001
z	1.282	1.645	2.326	2.576	3.090
−z	−1.282	−1.645	−2.326	−2.576	−3.090
	Significance level (two-tailed) 0.1	0.05	0.01	0.005	0.001
z	1.645	1.960	2.576	2.813	3.291
−z	−1.645	−1.960	−2.576	−2.813	−3.291

C8 Critical Values of Pearson's Product-Moment Correlation Coefficient r

Degrees of freedom	Significance level (one-tailed) 0.05	0.025	0.01	0.005
	Significance level (two-tailed) 0.1	0.05	0.02	0.01
1	0.9877	0.9969	0.9995	0.9999
2	0.900	0.950	0.980	0.990
3	0.805	0.878	0.934	0.959
4	0.729	0.811	0.882	0.917
5	0.669	0.755	0.833	0.875
6	0.622	0.707	0.789	0.834
7	0.582	0.666	0.750	0.798
8	0.549	0.632	0.716	0.765
9	0.521	0.602	0.685	0.735
10	0.497	0.576	0.658	0.708
11	0.476	0.553	0.634	0.684
12	0.458	0.532	0.612	0.661
13	0.441	0.514	0.592	0.641
14	0.426	0.497	0.574	0.623
15	0.412	0.482	0.558	0.606
16	0.400	0.468	0.543	0.590
17	0.389	0.456	0.529	0.575
18	0.378	0.444	0.516	0.561
19	0.369	0.433	0.503	0.549
20	0.360	0.423	0.492	0.537
25	0.323	0.381	0.445	0.487
30	0.296	0.349	0.409	0.449
35	0.275	0.325	0.381	0.418
40	0.257	0.304	0.358	0.393
45	0.243	0.288	0.338	0.372
50	0.231	0.273	0.322	0.354
60	0.211	0.250	0.295	0.325
70	0.195	0.232	0.274	0.302
80	0.183	0.217	0.257	0.283
90	0.173	0.205	0.242	0.267
100	0.164	0.195	0.230	0.254

Reject H_0 if calculated value of r is **greater than** critical value at chosen significance level (in absolute terms).

C4 Critical Values of Student's t

	Significance level (one-tailed)				
	0.05	0.025	0.01	0.005	0.0005
Degrees of freedom	Significance level (two-tailed)				
	0.1	0.05	0.02	0.01	0.001
1	6.31	12.71	31.82	63.66	636.62
2	2.92	4.30	6.97	9.93	31.60
3	2.35	3.18	4.54	5.84	12.92
4	2.13	2.78	3.75	4.60	8.61
5	2.01	2.57	3.37	4.03	6.86
6	1.94	2.45	3.14	3.71	5.96
7	1.89	2.37	3.00	3.50	5.41
8	1.86	2.31	2.90	3.35	5.04
9	1.83	2.26	2.82	3.25	4.78
10	1.81	2.23	2.76	3.17	4.59
11	1.80	2.20	2.72	3.11	4.44
12	1.78	2.18	2.68	3.05	4.32
13	1.77	2.16	2.65	3.01	4.22
14	1.76	2.15	2.62	2.98	4.14
15	1.75	2.13	2.60	2.95	4.07
16	1.75	2.12	2.58	2.92	4.01
17	1.74	2.11	2.57	2.90	3.97
18	1.73	2.10	2.55	2.88	3.92
19	1.73	2.09	2.54	2.86	3.88
20	1.73	2.09	2.53	2.85	3.85
21	1.72	2.08	2.52	2.83	3.82
22	1.72	2.07	2.51	2.82	3.79
23	1.71	2.07	2.50	2.81	3.77
24	1.71	2.06	2.49	2.80	3.75
25	1.71	2.06	2.49	2.79	3.73
26	1.71	2.06	2.48	2.78	3.71
27	1.70	2.05	2.47	2.77	3.69
28	1.70	2.05	2.47	2.76	3.67
29	1.70	2.05	2.46	2.76	3.66
30	1.70	2.04	2.46	2.75	3.65
40	1.68	2.02	2.42	2.70	3.55
60	1.67	2.00	2.39	2.66	3.46
120	1.66	1.98	2.36	2.62	3.37
∞	1.65	1.96	2.33	2.58	3.29

Reject H_0 if calculated value of t is **greater than** critical value at chosen significance level.