



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF HEALTH SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE
COMMUNITY HEALTH AND DEVELOPMENT
4TH YEAR 1ST SEMESTER 2024/2025 ACADEMIC YEAR
KISUMU CAMPUS

COURSE CODE: SBB 1409
COURSE TITLE: BIOSTATISTICS 11
EXAM VENUE: STREAM: BSc Public/ Comm. Hlth & Dev
DATE: **EXAM SESSION:**
TIME: 2.00 HOURS

Instructions:

- 1. Answer all the questions in Section A and 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A

Answer all questions (30 Marks)

Question 1

- a) (i) Explain Four roles of statistics **(4 Marks)**
- (ii) Using diagrams, differentiate between histogram and polygon. **(4 Marks)**
- b) The following data relates to marks of eight students in Science exam.
- | Student | Science |
|---------|---------|
| 1 | 31 |
| 2 | 25 |
| 3 | 52 |
| 4 | 96 |
| 5 | 48 |
| 6 | 60 |
| 7 | 63 |
| 8 | 79 |
- Calculate the standard error of the means in the Science test. **(5 Marks)**
- c) A data set on money spent on fast food by a sample of 200 households has a lowest value of KSh1 and a highest value of KSh1167. Group the data into six classes of equal widths with the lower limit of the first class as KSh1.
- i) Calculate the approximate class width. **(1 Mark)**
- ii) Write the class limits for all six classes. **(3 Marks)**
- iii) What are the class boundaries and class midpoints for each class? **(3 Marks)**
- d) In village Y, 17 patients with angina pectoris from a sample mean, $\bar{X} = 5.81$ with a sample standard deviation: $s=1.21$ was observed. Calculate the approximate 95% CI of the sampled participants with angina pectoris in Village X. **(3 Marks)**
- e) A workshop produces 2500 drugs per day. The mean weight of drugs 125kg with a variance of 100kg. assuming normal distribution, how many drugs are less than 142kg. **(2 Marks)**
- f) Maxwel's company produces drugs. The company claims that 25% of the drugs are Astrazeneca (AZ), 60% Moderna and 15% Pfizer. A random sample of 150 drugs has 60 AZ, 55 Moderna and 45 Pfizer. Is this consistent with Maxwel company's claim. Use alpha 0.025 level of significance. **(5 Marks)**

SECTION B

Answer any two Questions (40 Marks)

Question 2.

a) The prices of a drug on different days of a month were recorded as follows:

66 65 68 70 69 71 70 65 65 68

Test whether the mean prices of the drug in the month is 65 at $\alpha=0.05$. **(6 Marks)**

b) There were 1500 students who sat for an end year examination. The mean mark was 68; with a variance of 16. Find the number of students who got marks between 72 and 75, assuming a normal distribution. **(4 Marks)**

c) Consider the following scores of students in a Biostatistics exam from two groups.

Biostatistics I		Biostatistics II	
Class interval	Number of students	Class interval	Number of students
5-20	5	5-20	5
20-35	5	20-35	5
35-50	15	35-50	15
50-65	13	50-65	7
65-80	7	65-80	12
80-95	5	80-95	6

Based on the values of (i) Mean, (ii) Mode and (iii) Median, comment in each case which group have the better average scores. **(10 Marks)**

Question 3.

a) Define the following terms: **(5 Marks)**

- i) Type II error
- ii) Null hypothesis
- iii) Chi-square test of Goodness of fit
- iv) Z- score
- v) Analysis of Variance

b) The data manager at a company that manufactures drugs wants to determine whether there are differences in the quality of workmanship among the three daily shifts. She randomly selects 496 drugs and carefully inspects them. Each drug is either classified as perfect, satisfactory, or defective and the shift that produced it is also recorded. The data is summarized in the two-way table below.

	Perfect	Satisfactory	Defective
Shift 1	106	120	5
Shift 2	67	79	7
Shift 3	37	69	6

Do these data provide sufficient evidence at 5% significance level to infer that there are differences in quality among the three shifts? **(15 Marks)**

Question 4.

- a) A sample of 200 COVID-19 patients is selected. Out of these, 100 are given a drug and others are not given any drug. The results of the clinical trial are shown below.

	Number of people		Row totals
	Given drug	Not given drug	
Cured	65	55	
Not cured	35	45	
Column totals	100	100	

At 5% level of significance, test the hypothesis that the drug is effective in curing COVID-19. **(10 Marks)**

- b) The test scores in a QT examination are normally distributed, with a population mean of 100. Suppose 20 people are randomly selected and tested. The standard deviation in the sample group is 15. Test the hypothesis that the average test score in the sample group will be less than 110. **(3 Marks)**
- c) JOOUST has conducted a survey on the relationship between the age of students (x) and their weight, kg (y). A sample of eight students indicated below.

Age (x)	19	16	14	13	15	16	18	14
Weight (y)	65	60	55	45	58	63	75	53

Fit a regression equation for the data then estimate the average weight of a student aged 20 years. **(7 Marks)**

Question 5.

The following data describes the number of orders received by a drug company each week over a period of 50 weeks.

- a) Classify the data using the exclusive method with a class interval of 10 then display it using a frequency polygon. **(6 Marks)**

24	13	28	15	25	29	15	46	23	17
9	10	17	22	23	17	16	32	13	21
11	12	18	20	13	27	18	22	28	23
20	14	26	14	19	19	40	31	15	26
17	21	23	26	18	24	21	27	25	18

- b) By using the Karl Pearson correlation coefficient, examine whether the input of the drugs and the output of success can be said to be correlated. **(10 Marks)**

Drug input	6.9	8.2	7.9	4.8	9.6	8.1	7.8
Success Outcome	1.9	3.5	6.5	1.4	5.8	3.9	2.7

- c) Using illustrations, describe. **(4 Marks)**
- Symmetrical distribution
 - Positively skewed distribution
 - Negatively skewed distribution
 - Uniform or rectangular distribution.

Formulas

- Population mean (μ)
- Sample mean (\bar{X} or M)

$$\mu = \frac{\sum X}{N}$$

$$\bar{X} = \frac{\sum X}{n}$$

- Population variance (σ^2) and standard deviation (σ)
Note: SS = Sum of Squares

$$\sigma^2 = \frac{SS}{N} \quad \text{or} \quad \sigma^2 = \frac{\sum(X-\mu)^2}{N}$$

$$\sigma = \sqrt{\frac{SS}{N}} \quad \text{or} \quad \sigma = \sqrt{\frac{\sum(X-\mu)^2}{N}}$$

- Sample variance (s^2) and standard deviation (s or SD)

$$s^2 = \frac{SS}{n-1} \quad \text{or} \quad s^2 = \frac{\sum(X-\bar{X})^2}{n-1}$$

$$s = \sqrt{\frac{SS}{n-1}} \quad \text{or} \quad s = \sqrt{\frac{\sum(X-\bar{X})^2}{n-1}}$$

- Z scores (or standard scores)

$$\text{Sample: } z = \frac{X-\bar{X}}{s} \quad \text{Population: } z = \frac{X-\mu}{\sigma}$$

- z-test

$$z = \frac{M-\mu}{\sigma_M}, \text{ where}$$

$$\sigma_M = \frac{\sigma}{\sqrt{n}}$$

- Correlation coefficient

$$r = \frac{SP}{\sqrt{SS_X SS_Y}} \text{ where, } SP = \sum(X - M_X)(Y - M_Y)$$

TABLE B.1 THE UNIT NORMAL TABLE*

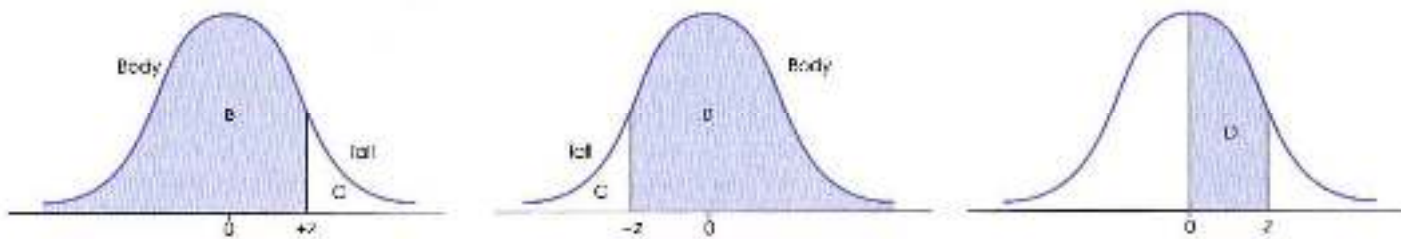
*Column A lists z-score values. A vertical line drawn through a normal distribution at a z-score location divides the distribution into two sections.

Column B identifies the proportion in the larger section, called the *body*.

Column C identifies the proportion in the smaller section, called the *tail*.

Column D identifies the proportion between the mean and the z-score.

Note: Because the normal distribution is symmetrical, the proportions for negative z-scores are the same as those for positive z-scores.



(A) z	(B) Proportion in Body	(C) Proportion in Tail	(D) Proportion Between Mean and z	(A) z	(B) Proportion in Body	(C) Proportion in Tail	(D) Proportion Between Mean and z
0.00	.5000	.5000	.0000	0.25	.5987	.4013	.0987
0.01	.5040	.4960	.0040	0.26	.6026	.3974	.1026
0.02	.5080	.4920	.0080	0.27	.6064	.3936	.1064
0.03	.5120	.4880	.0120	0.28	.6103	.3897	.1103
0.04	.5160	.4840	.0160	0.29	.6141	.3859	.1141
0.05	.5199	.4801	.0199	0.30	.6179	.3821	.1179
0.06	.5239	.4761	.0239	0.31	.6217	.3783	.1217
0.07	.5279	.4721	.0279	0.32	.6255	.3745	.1255
0.08	.5319	.4681	.0319	0.33	.6293	.3707	.1293
0.09	.5359	.4641	.0359	0.34	.6331	.3669	.1331
0.10	.5398	.4602	.0398	0.35	.6368	.3632	.1368
0.11	.5438	.4562	.0438	0.36	.6406	.3594	.1406
0.12	.5478	.4522	.0478	0.37	.6443	.3557	.1443
0.13	.5517	.4483	.0517	0.38	.6480	.3520	.1480
0.14	.5557	.4443	.0557	0.39	.6517	.3483	.1517
0.15	.5596	.4404	.0596	0.40	.6554	.3446	.1554
0.16	.5636	.4364	.0636	0.41	.6591	.3409	.1591
0.17	.5675	.4325	.0675	0.42	.6628	.3372	.1628
0.18	.5714	.4286	.0714	0.43	.6664	.3336	.1664
0.19	.5753	.4247	.0753	0.44	.6700	.3300	.1700
0.20	.5793	.4207	.0793	0.45	.6736	.3264	.1736
0.21	.5832	.4168	.0832	0.46	.6772	.3228	.1772
0.22	.5871	.4129	.0871	0.47	.6808	.3192	.1808
0.23	.5910	.4090	.0910	0.48	.6844	.3156	.1844
0.24	.5948	.4052	.0948	0.49	.6879	.3121	.1879

(A) z	(B) Proportion in Body	(C) Proportion in Tail	(D) Proportion Between Mean and z	(A) z	(B) Proportion in Body	(C) Proportion in Tail	(D) Proportion Between Mean and z
0.50	.6915	.3085	.1915	1.00	.8413	.1587	.3413
0.51	.6950	.3050	.1950	1.01	.8438	.1562	.3438
0.52	.6985	.3015	.1985	1.02	.8461	.1539	.3461
0.53	.7019	.2981	.2019	1.03	.8485	.1515	.3485
0.54	.7054	.2946	.2054	1.04	.8508	.1492	.3508
0.55	.7088	.2912	.2088	1.05	.8531	.1469	.3531
0.56	.7123	.2877	.2123	1.06	.8554	.1446	.3554
0.57	.7157	.2843	.2157	1.07	.8577	.1423	.3577
0.58	.7190	.2810	.2190	1.08	.8599	.1401	.3599
0.59	.7226	.2776	.2226	1.09	.8621	.1379	.3621
0.60	.7257	.2743	.2257	1.10	.8643	.1357	.3643
0.61	.7291	.2709	.2291	1.11	.8665	.1335	.3665
0.62	.7324	.2676	.2324	1.12	.8686	.1314	.3686
0.63	.7357	.2643	.2357	1.13	.8708	.1292	.3708
0.64	.7389	.2611	.2389	1.14	.8729	.1271	.3729
0.65	.7422	.2578	.2422	1.15	.8749	.1251	.3749
0.66	.7454	.2546	.2454	1.16	.8770	.1230	.3770
0.67	.7486	.2514	.2486	1.17	.8790	.1210	.3790
0.68	.7517	.2483	.2517	1.18	.8810	.1190	.3810
0.69	.7549	.2451	.2549	1.19	.8830	.1170	.3830
0.70	.7580	.2420	.2580	1.20	.8849	.1151	.3849
0.71	.7611	.2389	.2611	1.21	.8869	.1131	.3869
0.72	.7642	.2358	.2642	1.22	.8888	.1112	.3888
0.73	.7673	.2327	.2673	1.23	.8907	.1093	.3907
0.74	.7704	.2296	.2704	1.24	.8925	.1075	.3925
0.75	.7734	.2266	.2734	1.25	.8944	.1056	.3944
0.76	.7764	.2236	.2764	1.26	.8962	.1038	.3962
0.77	.7794	.2206	.2794	1.27	.8980	.1020	.3980
0.78	.7823	.2177	.2823	1.28	.8997	.1003	.3997
0.79	.7852	.2148	.2852	1.29	.9015	.0985	.4015
0.80	.7881	.2119	.2881	1.30	.9032	.0968	.4032
0.81	.7910	.2090	.2910	1.31	.9049	.0951	.4049
0.82	.7939	.2061	.2939	1.32	.9065	.0934	.4066
0.83	.7967	.2033	.2967	1.33	.9082	.0918	.4082
0.84	.7995	.2005	.2995	1.34	.9099	.0901	.4099
0.85	.8023	.1977	.3023	1.35	.9115	.0885	.4115
0.86	.8051	.1949	.3051	1.36	.9131	.0869	.4131
0.87	.8078	.1922	.3078	1.37	.9147	.0853	.4147
0.88	.8105	.1894	.3106	1.38	.9162	.0838	.4162
0.89	.8133	.1867	.3133	1.39	.9177	.0823	.4177
0.90	.8159	.1841	.3159	1.40	.9192	.0808	.4192
0.91	.8186	.1814	.3186	1.41	.9207	.0793	.4207
0.92	.8212	.1788	.3212	1.42	.9222	.0778	.4222
0.93	.8238	.1762	.3238	1.43	.9236	.0764	.4236
0.94	.8264	.1736	.3264	1.44	.9251	.0749	.4251
0.95	.8289	.1711	.3289	1.45	.9265	.0735	.4265
0.96	.8315	.1685	.3315	1.46	.9279	.0721	.4279
0.97	.8340	.1660	.3340	1.47	.9293	.0708	.4292
0.98	.8365	.1635	.3365	1.48	.9306	.0694	.4305
0.99	.8389	.1611	.3389	1.49	.9319	.0681	.4319

(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
z	Proportion in Body	Proportion in Tail	Proportion Between Mean and z	z	Proportion in Body	Proportion in Tail	Proportion Between Mean and z
1.50	.9332	.0668	.4332	2.00	.9772	.0228	.4772
1.51	.9345	.0655	.4345	2.01	.9778	.0222	.4778
1.52	.9357	.0643	.4357	2.02	.9783	.0217	.4783
1.53	.9370	.0630	.4370	2.03	.9788	.0212	.4788
1.54	.9382	.0618	.4382	2.04	.9793	.0207	.4793
1.55	.9394	.0606	.4394	2.05	.9798	.0202	.4798
1.56	.9406	.0594	.4406	2.06	.9803	.0197	.4803
1.57	.9418	.0582	.4418	2.07	.9808	.0192	.4808
1.58	.9429	.0571	.4429	2.08	.9812	.0188	.4812
1.59	.9441	.0559	.4441	2.09	.9817	.0183	.4817
1.60	.9452	.0548	.4452	2.10	.9821	.0179	.4821
1.61	.9463	.0537	.4463	2.11	.9826	.0174	.4826
1.62	.9474	.0526	.4474	2.12	.9830	.0170	.4830
1.63	.9484	.0516	.4484	2.13	.9834	.0166	.4834
1.64	.9495	.0505	.4495	2.14	.9838	.0162	.4838
1.65	.9505	.0495	.4505	2.15	.9842	.0158	.4842
1.66	.9515	.0485	.4515	2.16	.9846	.0154	.4846
1.67	.9525	.0475	.4525	2.17	.9850	.0150	.4850
1.68	.9535	.0466	.4535	2.18	.9854	.0146	.4854
1.69	.9545	.0455	.4545	2.19	.9857	.0143	.4857
1.70	.9554	.0446	.4554	2.20	.9861	.0139	.4861
1.71	.9564	.0436	.4564	2.21	.9864	.0136	.4864
1.72	.9573	.0427	.4573	2.22	.9868	.0132	.4868
1.73	.9582	.0418	.4582	2.23	.9871	.0129	.4871
1.74	.9591	.0409	.4591	2.24	.9875	.0125	.4875
1.75	.9599	.0401	.4599	2.25	.9878	.0122	.4878
1.76	.9608	.0392	.4608	2.26	.9881	.0119	.4881
1.77	.9616	.0384	.4616	2.27	.9884	.0116	.4884
1.78	.9625	.0375	.4625	2.28	.9887	.0113	.4887
1.79	.9633	.0367	.4633	2.29	.9890	.0110	.4890
1.80	.9641	.0359	.4641	2.30	.9893	.0107	.4893
1.81	.9649	.0351	.4649	2.31	.9896	.0104	.4896
1.82	.9656	.0344	.4656	2.32	.9898	.0102	.4898
1.83	.9664	.0336	.4664	2.33	.9901	.0099	.4901
1.84	.9671	.0329	.4671	2.34	.9904	.0096	.4904
1.85	.9678	.0322	.4678	2.35	.9906	.0094	.4906
1.86	.9686	.0314	.4686	2.36	.9909	.0091	.4909
1.87	.9693	.0307	.4693	2.37	.9911	.0089	.4911
1.88	.9699	.0301	.4699	2.38	.9913	.0087	.4913
1.89	.9706	.0294	.4706	2.39	.9916	.0084	.4916
1.90	.9713	.0287	.4713	2.40	.9918	.0082	.4918
1.91	.9719	.0281	.4719	2.41	.9920	.0080	.4920
1.92	.9726	.0274	.4726	2.42	.9922	.0078	.4922
1.93	.9732	.0268	.4732	2.43	.9925	.0075	.4925
1.94	.9738	.0262	.4738	2.44	.9927	.0073	.4927
1.95	.9744	.0256	.4744	2.45	.9929	.0071	.4929
1.96	.9750	.0250	.4750	2.46	.9931	.0069	.4931
1.97	.9756	.0244	.4756	2.47	.9932	.0068	.4932
1.98	.9761	.0239	.4761	2.48	.9934	.0066	.4934
1.99	.9767	.0233	.4767	2.49	.9936	.0064	.4936

(A) z	(B) Proportion in Body	(C) Proportion in Tail	(D) Proportion Between Mean and z	(A) z	(B) Proportion in Body	(C) Proportion in Tail	(D) Proportion Between Mean and z
2.50	.9938	.0062	.4938	2.55	.9984	.0016	.4984
2.51	.9940	.0060	.4940	2.56	.9985	.0015	.4985
2.52	.9941	.0059	.4941	2.57	.9985	.0015	.4985
2.53	.9943	.0057	.4943	2.58	.9986	.0014	.4986
2.54	.9945	.0055	.4945	2.59	.9986	.0014	.4986
2.55	.9946	.0054	.4946	3.00	.9987	.0013	.4987
2.56	.9948	.0052	.4948	3.01	.9987	.0013	.4987
2.57	.9949	.0051	.4949	3.02	.9987	.0013	.4987
2.58	.9951	.0049	.4951	3.03	.9988	.0012	.4988
2.59	.9952	.0048	.4952	3.04	.9988	.0012	.4988
2.60	.9953	.0047	.4953	3.05	.9989	.0011	.4989
2.61	.9955	.0045	.4955	3.06	.9989	.0011	.4989
2.62	.9956	.0044	.4956	3.07	.9989	.0011	.4989
2.63	.9957	.0043	.4957	3.08	.9990	.0010	.4990
2.64	.9959	.0041	.4959	3.09	.9990	.0010	.4990
2.65	.9960	.0040	.4960	3.10	.9990	.0010	.4990
2.66	.9961	.0039	.4961	3.11	.9991	.0009	.4991
2.67	.9962	.0038	.4962	3.12	.9991	.0009	.4991
2.68	.9963	.0037	.4963	3.13	.9991	.0009	.4991
2.69	.9964	.0036	.4964	3.14	.9992	.0008	.4992
2.70	.9965	.0035	.4965	3.15	.9992	.0008	.4992
2.71	.9966	.0034	.4966	3.16	.9992	.0008	.4992
2.72	.9967	.0033	.4967	3.17	.9992	.0008	.4992
2.73	.9968	.0032	.4968	3.18	.9992	.0007	.4992
2.74	.9969	.0031	.4969	3.19	.9992	.0007	.4992
2.75	.9970	.0030	.4970	3.20	.9993	.0007	.4992
2.76	.9971	.0029	.4971	3.21	.9993	.0007	.4992
2.77	.9972	.0028	.4972	3.22	.9994	.0006	.4994
2.78	.9973	.0027	.4973	3.23	.9994	.0006	.4994
2.79	.9974	.0026	.4974	3.24	.9994	.0006	.4994
2.80	.9974	.0026	.4974	3.30	.9995	.0005	.4995
2.81	.9975	.0025	.4975	3.40	.9997	.0003	.4997
2.82	.9976	.0024	.4976	3.50	.9998	.0002	.4998
2.83	.9977	.0023	.4977	3.60	.9998	.0002	.4998
2.84	.9977	.0023	.4977	3.70	.9999	.0001	.4999
2.85	.9978	.0022	.4978	3.80	.9999	.0000	.4999
2.86	.9979	.0021	.4979	3.90	.9999	.0000	.4999
2.87	.9979	.0021	.4979	4.00	.9999	.0000	.4999
2.88	.9980	.0020	.4980				
2.89	.9981	.0019	.4981				
2.90	.9981	.0019	.4981				
2.91	.9982	.0018	.4982				
2.92	.9982	.0018	.4982				
2.93	.9983	.0017	.4983				
2.94	.9984	.0016	.4984				

Table: Chi-Square Probabilities

The areas given across the top are the areas to the right of the critical value. To look up an area on the left, subtract it from one, and then look it up (ie: 0.05 on the left is 0.95 on the right)

df	0.995	0.99	0.975	0.95	0.90	0.80	0.70	0.60	0.50	0.40	0.30
1	---	---	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879	
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597	
3	0.072	0.151	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838	
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860	
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750	
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548	
7	0.889	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278	
8	1.344	1.666	2.179	2.733	3.420	13.362	15.507	17.535	20.090	21.955	
9	1.735	2.078	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589	
10	2.156	2.558	3.177	3.940	4.878	15.987	18.307	20.483	23.209	25.188	
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757	
12	3.074	3.571	4.404	5.226	6.304	18.574	21.026	23.337	26.217	28.300	
13	3.565	4.107	5.009	5.892	7.042	19.882	22.362	24.736	27.688	29.819	
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319	
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801	
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267	
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718	
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156	

df	0.9 95	0.9 9	0.9 75	0.9 5	0.9 0	0.10	0.05	0.02 5	0.01	0.00 5
1 9	6.8 44	7.6 33	8.9 07	10. 117	11. 651	27.2 04	30.1 44	32.8 52	36.1 91	38.5 82
2 0	7.4 34	8.2 60	9.5 91	10. 851	12. 443	28.4 12	31.4 10	34.1 70	37.5 66	39.9 97
2 1	8.0 34	8.8 97	10. 283	11. 591	13. 240	29.6 15	32.6 71	35.4 79	38.9 32	41.4 01
2 2	8.6 43	9.5 42	10. 982	12. 338	14. 041	30.8 13	33.9 24	36.7 81	40.2 89	42.7 96
2 3	9.2 60	10. 196	11. 689	13. 091	14. 848	32.0 07	35.1 72	38.0 76	41.6 38	44.1 81
2 4	9.8 86	10. 856	12. 401	13. 848	15. 659	33.1 96	36.4 15	39.3 64	42.9 80	45.5 59
2 5	10. 520	11. 524	13. 120	14. 611	16. 473	34.3 82	37.6 52	40.6 46	44.3 14	46.9 28
2 6	11. 160	12. 198	13. 844	15. 379	17. 292	35.5 63	38.8 85	41.9 23	45.6 42	48.2 90
2 7	11. 808	12. 879	14. 573	16. 151	18. 114	36.7 41	40.1 13	43.1 95	46.9 63	49.6 45
2 8	12. 461	13. 565	15. 308	16. 928	18. 939	37.9 16	41.3 37	44.4 61	48.2 78	50.9 93
2 9	13. 121	14. 256	16. 047	17. 708	19. 768	39.0 87	42.5 57	45.7 22	49.5 88	52.3 36
3 0	13. 787	14. 953	16. 791	18. 493	20. 599	40.2 56	43.7 73	46.9 79	50.8 92	53.6 72
4 0	20. 707	22. 164	24. 433	26. 509	29. 051	51.8 05	55.7 58	59.3 42	63.6 91	66.7 66
5 0	27. 991	29. 707	32. 357	34. 764	37. 689	63.1 67	67.5 05	71.4 20	76.1 54	79.4 90
6 0	35. 534	37. 485	40. 482	43. 188	46. 459	74.3 97	79.0 82	83.2 98	88.3 79	91.9 52
7 0	43. 275	45. 442	48. 758	51. 739	55. 329	85.5 27	90.5 31	95.0 23	100. 425	104. 215
8 0	51. 172	53. 540	57. 153	60. 391	64. 278	96.5 78	101. 879	106. 629	112. 329	116. 321
9 0	59. 196	61. 754	65. 647	69. 126	73. 291	107. 565	113. 145	118. 136	124. 116	128. 299
1 0 0	67. 328	70. 065	74. 222	77. 929	82. 358	118. 498	124. 342	129. 561	135. 807	140. 169

TABLE B.6 CRITICAL VALUES FOR THE PEARSON CORRELATION*

*To be significant, the sample correlation, r , must be greater than or equal to the critical value in the table.

$d.f. = n - 2$	Level of Significance for One-Tailed Test			
	.05	.025	.01	.005
	Level of Significance for Two-Tailed Test			
	.10	.05	.02	.01
1	.988	.997	.9995	.9999
2	.900	.950	.980	.990
3	.805	.878	.934	.959
4	.729	.811	.882	.917
5	.669	.754	.833	.874
6	.622	.707	.789	.834
7	.582	.666	.750	.798
8	.549	.632	.716	.765
9	.521	.602	.685	.735
10	.497	.576	.658	.708
11	.476	.553	.634	.684
12	.458	.532	.612	.661
13	.441	.514	.592	.641
14	.426	.497	.574	.623
15	.412	.482	.558	.606
16	.400	.468	.542	.590
17	.389	.456	.528	.575
18	.378	.444	.516	.561
19	.369	.433	.503	.549
20	.360	.423	.492	.537
21	.352	.413	.482	.526
22	.344	.404	.472	.515
23	.337	.396	.462	.505
24	.330	.388	.453	.496
25	.323	.381	.445	.487
26	.317	.374	.437	.479
27	.311	.367	.430	.471
28	.305	.361	.423	.463
29	.301	.355	.416	.456
30	.296	.349	.409	.449
35	.275	.325	.381	.418
40	.257	.304	.358	.393
45	.243	.288	.338	.372
50	.231	.273	.322	.354
60	.211	.250	.295	.325
70	.195	.232	.274	.302
80	.183	.217	.256	.283
90	.173	.205	.242	.267
100	.164	.195	.230	.254

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