

[This question paper contains 16 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5079

L

Unique Paper Code : 2274001202

Name of the Paper : Basic Statistics for Economics

Name of the Course : **GENERIC ELECTIVE**

Semester : II/IV/VI/VIII

Duration : 3 Hours

Maximum Marks : 90

समय : 3 घण्टे

पूर्णांक : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **all** questions from **Section-I** and **two** questions each from **Sections-II, III and IV**.
3. Sub-parts of the questions to be attempted together.
4. Questions in **Section I** carry **15** marks and all questions in **Section II, III and IV** carry **10** marks.
5. Use of Simple Calculator is allowed.
6. Answers may be written either in English or Hindi; but the same medium should be used throughout the paper.

छात्रों के लिए निर्देश

1. इस प्रश्न-पत्र के मिलते ही ऊपर दिए गए निर्धारित स्थान पर अपना अनुक्रमांक लिखिए।
2. खंड-I के सभी प्रश्न और खंड-II, III तथा IV में से प्रत्येक से दो प्रश्न हल करें।
3. प्रश्नों के उप-भागों को एक साथ हल किया जाना चाहिए।
4. खंड I के प्रश्नों के लिए 15 अंक और खंड II, III तथा IV के सभी प्रश्नों के लिए 10 अंक निर्धारित हैं।
5. साधारण कैलकुलेटर का उपयोग करने की अनुमति है।
6. इस प्रश्न-पत्र का उत्तर अंग्रेजी या हिंदी किसी एक भाषा में दीजिए, लेकिन सभी उत्तरों का माध्यम एक ही होना चाहिए।

P.T.O.

Section – I*(Attempt ALL Questions)*

1. (a) “Statistics is a backbone of business decision” Discuss with types of its application in business? (10)

- (b) Calculate mean and median for the following sample? (5)

18,10,15,13,17,15,12,15,18,16,11

2. (a) Define the ‘Mean’, ‘Median’, and ‘Mode’. In which scenario would the Median be a better measure of central tendency than the Mean? (10)

- (b) Calculate Variance and Coefficient of Variation of the following data (in kgs) (5)

Fruits (Kgs)	4	2	1	0	1
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Section II*(Attempt ANY TWO Questions)*

3. In a factory producing spark plugs A, B and C manufacture 45% 35% and 20% of the total output respectively. Out of their output respectively 4%, 3% and 2% are known to be defective. A spark plug is packed at random and is found to be defective. Find the probability that :

(a) It is produced by machine A

(b) It is produced by machine B

(c) It is produced by machine A or B

(3+3+4)

4. A survey shows 56% of all workers have Life insurance, 68% have Health insurance and 49% have both benefits. A worker was selected at random.
- (a) What is the probability that the worker has neither health insurance nor a life insurance?
 - (b) What is the probability that the worker has health insurance given that they have a life insurance?
 - (c) Are having health insurance and a life insurance independent events?
- (3+3+4)
5. (a) What are mutually and non-mutually exclusive events? Explain with a suitable example. (5)
- (b) In a class of 50 students 20 like Statistics, 15 like history and 5 like both. What is the probability that the student likes at least one subject? (5)

Section – III

(Attempt ANY TWO Questions)

6. The lifetime of cutting battery has a Mean life of 800 hours and Standard deviation is 90 hours. Assuming the distribution to be normal. Find :
- (a) the percentage of batteries with a lifetime of at least 900 hours.
 - (b) the population of batteries with a lifetime between 750 to 850 hours.
- (5+5)
7. In a class of 15 students who gives test mean is 28.1%
- (a) Calculate mean and standard deviation of the distribution.

- (b) Determine the probability that more than four students give the test.

(5+5)

8. (a) What is Uniform distribution? When is it used? (5)

- (b) Given X and Y are independent random variables with $E(X) = 10$, $\text{Var}(X) = 4$, $E(Y) = 20$, $\text{Var}(Y) = 9$.

Find :

(i) $E(2X + 3Y)$

(ii) $\text{Var}(2X + 3Y)$ (5)

Section – IV

(Attempt ANY TWO Questions)

9. (a) What is null and alternative hypothesis? Explain using suitable examples.

(5)

- (b) Differentiate between Type 1 and Type 2 errors?

(5)

10. (a) What do you understand by p value? Explain the use of p value in hypothesis testing and decision rule in comparison to level of significance. (5)

- (b) A dry fruit company claims that every pack of dry fruit carries 100 grams of almonds. A sample of 25 packets was selected to ensure that the content is not less than 100 grams. The weight follows normal distribution with population standard deviation of 10.

Frame the appropriate hypothesis and test at 5% level of significance (using the concept of p value)

Interpret the result.

(5)

11. (a) A random sample of 110 observations has mean 0.81 and Standard deviation 0.34.

Calculate 95% confidence interval for population mean. (5)

- (b) How Confidence Interval is helpful in taking Statistical Decisions? (5)

खंड - I

(सभी प्रश्न अनिवार्य हैं)

1. (क) "सांख्यिकी व्यावसायिक निर्णयों की रीढ़ है" व्यवसाय में इसके अनुप्रयोगों के प्रकारों के साथ चर्चा कीजिए? (10)

- (ख) निम्नलिखित नमूने के लिए माध्य (Mean) और माध्यिका (Median) की गणना कीजिए? (5)

18, 10, 15, 13, 17, 15, 12, 15, 18, 16, 11
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2. (क) 'माध्य' (Mean), 'माध्यिका' (Median) और 'बहुलक' (Mode) को परिभाषित कीजिए। किस स्थिति में माध्यिका, माध्य की तुलना में केंद्रीय प्रवृत्ति का बेहतर माप होगी? (10)

- (ख) निम्नलिखित आंकड़ों (किलोग्राम में) के प्रसरण (Variance) और प्रसरण गुणांक (Coefficient of Variation) की गणना कीजिए : (5)

फल (किलोग्राम) :	4	2	1	0	1
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खंड - II

(किन्हीं दो प्रश्नों के उत्तर दें)

3. स्पार्क प्लग बनाने वाली एक फैक्ट्री में मशीनें A, B और C कुल उत्पादन का क्रमशः 45%, 35% और 20% उत्पादन करती हैं। उनके उत्पादन में से क्रमशः 4%, 3% और 2% दोषपूर्ण पाए जाते हैं। एक स्पार्क प्लग यादृच्छिक (random) रूप से चुना जाता है और वह दोषपूर्ण पाया जाता है। इसकी प्रायिकता ज्ञात कीजिए कि :

(क) यह मशीन A द्वारा निर्मित है।

(ख) यह मशीन B द्वारा निर्मित है।

(ग) यह मशीन A या B द्वारा निर्मित है। (3 + 3 + 4)

4. एक सर्वेक्षण से पता चलता है कि 56% श्रमिकों के पास जीवन बीमा (Life insurance) है, 68% के पास स्वास्थ्य बीमा (Health insurance) है और 49% के पास दोनों हैं। एक श्रमिक को यादृच्छिक रूप से चुना गया।

(क) इसकी क्या प्रायिकता है कि श्रमिक के पास न तो स्वास्थ्य बीमा है और न ही जीवन बीमा?

(ख) इसकी क्या प्रायिकता है कि श्रमिक के पास स्वास्थ्य बीमा है, यह देखते हुए कि उसके पास जीवन बीमा भी है?

(ग) क्या स्वास्थ्य बीमा और जीवन बीमा होना स्वतंत्र घटनाएँ (independent events) हैं?

(3 + 3 + 4)

5. (क) परस्पर अपवर्जी (Mutually Exclusive) और गैर-परस्पर अपवर्जी घटनाएँ क्या हैं? उपयुक्त उदाहरण सहित समझाएँ। (5)

(ख) 50 छात्रों की एक कक्षा में 20 को सांख्यिकी पसंद है, 15 को इतिहास पसंद है और 5 को दोनों पसंद हैं। इसकी क्या प्रायिकता है कि छात्र को कम से कम एक विषय पसंद है? (5)

खंड - III

(किन्हीं दो प्रश्नों के उत्तर दें)

6. कटिंग बैटरी का औसत जीवनकाल (Mean life) 800 घंटे और मानक विचलन (Standard deviation) 90 घंटे है। यह मानते हुए कि वितरण सामान्य (Normal) है, ज्ञात कीजिए :

(क) उन बैटरियों का प्रतिशत जिनका जीवनकाल कम से कम 900 घंटे है।

(ख) उन बैटरियों की संख्या (population) जिनका जीवनकाल 750 से 850 घंटों के बीच है।

(5 + 5)

7. 15 छात्रों की एक कक्षा में जो परीक्षा देते हैं, माध्य (Mean) 28.1% है।

(क) वितरण के माध्य और मानक विचलन की गणना कीजिए।

(ख) इसकी प्रायिकता ज्ञात कीजिए कि चार से अधिक छात्र परीक्षा देते हैं।

(5 + 5)

8. (क) एकसमान वितरण (Uniform distribution) क्या है? इसका उपयोग कब किया जाता है? (5)

(ख) मान लीजिए X और Y स्वतंत्र यादृच्छिक चर हैं जहाँ $E(X) = 10$, $\text{Var}(X) = 4$, $E(Y) = 20$, $\text{Var}(Y)$

$= 9$ ज्ञात कीजिए :

(i) $E(2X + 3Y)$

(ii) $\text{Var}(2X + 3Y)$ (5)

खंड - IV

(किन्हीं दो प्रश्नों के उत्तर दें)

9. (क) शून्य परिकल्पना (Null Hypothesis) और वैकल्पिक परिकल्पना (Alternative Hypothesis)

क्या हैं? उपयुक्त उदाहरणों का उपयोग करके समझाएँ। (5)

(ख) टाइप 1 (Type 1) और टाइप 2 (Type 2) त्रुटियों के बीच अंतर स्पष्ट कीजिए? (5)

10. (क) p -वैल्यू से आप क्या समझते हैं? परिकल्पना परीक्षण में p -वैल्यू के उपयोग और सार्थकता के स्तर

(level of significance) की तुलना में निर्णय नियम (decision rule) की व्याख्या कीजिए।

(5)

(ख) एक ड्राई फ्रूट कंपनी का दावा है कि ड्राई फ्रूट के प्रत्येक पैकेट में 100 ग्राम बादाम होते हैं। यह

सुनिश्चित करने के लिए कि सामग्री 100 ग्राम से कम नहीं है, 25 पैकेटों का एक नमूना चुना

गया। वजन 10 मानक विचलन के साथ सामान्य वितरण का पालन करता है। उपयुक्त परिकल्पना

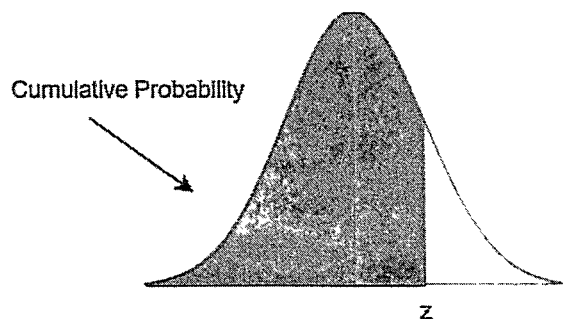
तैयार कीजिए और 5% सार्थकता स्तर पर (p -वैल्यू की अवधारणा का उपयोग करते हुए) परीक्षण

कीजिए। परिणाम की व्याख्या कीजिए।

(5)

11. (क) 110 प्रेक्षणों (observations) के एक यादृच्छिक नमूने का माध्य 0.81 और मानक विचलन 0.34 है। जनसंख्या माध्य के लिए 95% विश्वास अंतराल (confidence interval) की गणना कीजिए। (5)

- (ख) सांख्यिकीय निर्णय लेने में विश्वास अंतराल (Confidence Interval) कैसे सहायक होता है? (5)

[illegible]

Positive z

LESS THAN
Cumulative

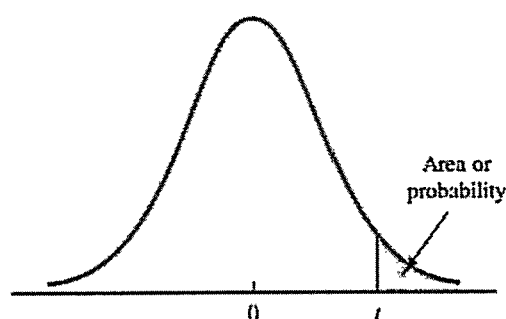
Negative z



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3065	0.3030	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

Appendix B Tables

TABLE 2 *t* DISTRIBUTION

Entries in the table give *t* values for an area or probability in the upper tail of the *t* distribution. For example, with 10 degrees of freedom and a .05 area in the upper tail, $t_{.05} = 1.812$.

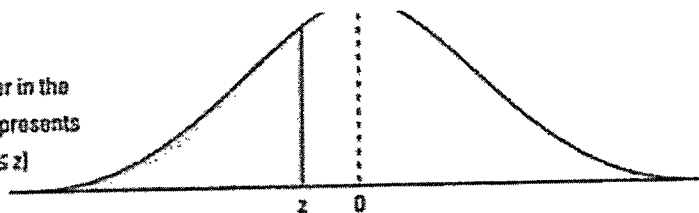
Degrees of Freedom	Area in Upper Tail					
	.20	.10	.05	.025	.01	.005
1	1.376	3.078	6.314	12.706	31.821	63.656
2	1.061	1.886	2.920	4.303	6.965	9.925
3	.978	1.638	2.353	3.182	4.541	5.841
4	.941	1.533	2.132	2.776	3.747	4.604
5	.920	1.476	2.015	2.571	3.365	4.032
6	.906	1.440	1.943	2.447	3.143	3.707
7	.896	1.415	1.895	2.365	2.998	3.499
8	.889	1.397	1.860	2.306	2.896	3.355
9	.883	1.383	1.833	2.262	2.821	3.250
10	.879	1.372	1.812	2.228	2.764	3.169
11	.876	1.363	1.796	2.201	2.718	3.106
12	.873	1.356	1.782	2.179	2.681	3.055
13	.870	1.350	1.771	2.160	2.650	3.012
14	.868	1.345	1.761	2.145	2.624	2.977
15	.866	1.341	1.753	2.131	2.602	2.947
16	.865	1.337	1.746	2.120	2.583	2.921
17	.863	1.333	1.740	2.110	2.567	2.898
18	.862	1.330	1.734	2.101	2.552	2.878
19	.861	1.328	1.729	2.093	2.539	2.861
20	.860	1.325	1.725	2.086	2.528	2.845
21	.859	1.323	1.721	2.080	2.518	2.831
22	.858	1.321	1.717	2.074	2.508	2.819
23	.858	1.319	1.714	2.069	2.500	2.807
24	.857	1.318	1.711	2.064	2.492	2.797
25	.856	1.316	1.708	2.060	2.485	2.787
26	.856	1.315	1.706	2.056	2.479	2.779
27	.855	1.314	1.703	2.052	2.473	2.771
28	.855	1.313	1.701	2.048	2.467	2.763
29	.854	1.311	1.699	2.045	2.462	2.756
30	.854	1.310	1.697	2.042	2.457	2.750
31	.853	1.309	1.696	2.040	2.453	2.744
32	.853	1.309	1.694	2.037	2.449	2.738
33	.853	1.308	1.692	2.035	2.445	2.733
34	.852	1.307	1.691	2.032	2.441	2.728

Appendix B Tables

TABLE 2 *t* DISTRIBUTION (Continued)

Degrees of Freedom	Area in Upper Tail					
	.20	.10	.05	.025	.01	.005
80	.846	1.292	1.664	1.990	2.374	2.639
81	.846	1.292	1.664	1.990	2.373	2.638
82	.846	1.292	1.664	1.989	2.373	2.637
83	.846	1.292	1.663	1.989	2.372	2.636
84	.846	1.292	1.663	1.989	2.372	2.636
85	.846	1.292	1.663	1.988	2.371	2.635
86	.846	1.291	1.663	1.988	2.370	2.634
87	.846	1.291	1.663	1.988	2.370	2.634
88	.846	1.291	1.662	1.987	2.369	2.633
89	.846	1.291	1.662	1.987	2.369	2.632
90	.846	1.291	1.662	1.987	2.368	2.632
91	.846	1.291	1.662	1.986	2.368	2.631
92	.846	1.291	1.662	1.986	2.368	2.630
93	.846	1.291	1.661	1.986	2.367	2.630
94	.845	1.291	1.661	1.986	2.367	2.629
95	.845	1.291	1.661	1.985	2.366	2.629
96	.845	1.290	1.661	1.985	2.366	2.628
97	.845	1.290	1.661	1.985	2.365	2.627
98	.845	1.290	1.661	1.984	2.365	2.627
99	.845	1.290	1.660	1.984	2.364	2.626
100	.845	1.290	1.660	1.984	2.364	2.626
∞	.842	1.282	1.645	1.960	2.326	2.576

Number in the
table represents
 $P(Z \leq z)$



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.6	.0002	.0002	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0438	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2948	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4502	.4462	.4422	.4383	.4343	.4304	.4264	.4225	.4186	.4147
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

α df	0.25	0.1	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005
1	1.000	3.078	6.314	12.706	31.821	63.656	127.321	318.289	636.576
2	0.816	1.886	2.920	4.303	6.965	9.925	14.089	22.328	31.600
3	0.765	1.638	2.353	3.182	4.541	5.841	7.453	10.214	12.924
4	0.741	1.533	2.132	2.776	3.747	4.604	5.598	7.173	8.610
5	0.727	1.476	2.015	2.571	3.365	4.032	4.773	5.894	6.869
6	0.718	1.440	1.943	2.447	3.143	3.707	4.317	5.208	5.959
7	0.711	1.415	1.895	2.365	2.998	3.499	4.029	4.785	5.408
8	0.706	1.397	1.860	2.306	2.896	3.355	3.833	4.501	5.041
9	0.703	1.383	1.833	2.262	2.821	3.250	3.690	4.297	4.781
10	0.700	1.372	1.812	2.228	2.764	3.169	3.581	4.144	4.587
11	0.697	1.363	1.796	2.201	2.718	3.106	3.497	4.025	4.437
12	0.695	1.356	1.782	2.179	2.681	3.055	3.428	3.930	4.318
13	0.694	1.350	1.771	2.160	2.650	3.012	3.372	3.852	4.221
14	0.692	1.345	1.761	2.145	2.624	2.977	3.326	3.787	4.140
15	0.691	1.341	1.753	2.131	2.602	2.947	3.286	3.733	4.073
16	0.690	1.337	1.746	2.120	2.583	2.921	3.252	3.686	4.015
17	0.689	1.333	1.740	2.110	2.567	2.898	3.222	3.646	3.965
18	0.688	1.330	1.734	2.101	2.552	2.878	3.197	3.610	3.922
19	0.688	1.328	1.729	2.093	2.539	2.861	3.174	3.579	3.883
20	0.687	1.325	1.725	2.086	2.528	2.845	3.153	3.552	3.850
21	0.686	1.323	1.721	2.080	2.518	2.831	3.135	3.527	3.819
22	0.686	1.321	1.717	2.074	2.508	2.819	3.119	3.505	3.792
23	0.685	1.319	1.714	2.069	2.500	2.807	3.104	3.485	3.768
24	0.685	1.318	1.711	2.064	2.492	2.797	3.091	3.467	3.745
25	0.684	1.316	1.708	2.060	2.485	2.787	3.078	3.450	3.725
26	0.684	1.315	1.706	2.056	2.479	2.779	3.067	3.435	3.707
27	0.684	1.314	1.703	2.052	2.473	2.771	3.057	3.421	3.689
28	0.683	1.313	1.701	2.048	2.467	2.763	3.047	3.408	3.674
29	0.683	1.311	1.699	2.045	2.462	2.756	3.038	3.396	3.660
30	0.683	1.310	1.697	2.042	2.457	2.750	3.030	3.385	3.646
40	0.681	1.303	1.684	2.021	2.423	2.704	2.971	3.307	3.551
60	0.679	1.296	1.671	2.000	2.390	2.660	2.915	3.232	3.460
120	0.677	1.289	1.658	1.980	2.358	2.617	2.860	3.160	3.373

t Table

cum. prob	t _{.50}	t _{.75}	t _{.80}	t _{.85}	t _{.90}	t _{.95}	t _{.975}	t _{.99}	t _{.995}	t _{.998}	t _{.999}
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.209	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.439	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.784	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.065	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
∞	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
0%	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
Confidence Level											