PGDM (RM) (17-19)

Statistics for Business Analysis

RM-103

Trimester – I, End-Term Examination: September 2017

Time allowed: 2 hrs 30 min

Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, **writing anything** except the Roll No will be treated as **Unfair Means.** In case of rough work **please use** answer sheet.

Sections	No. of Questions to attempt	Marks	Marks
A	3 out of 5 (Short Questions)	5 Marks each	3*5 = 15
B	2 out of 3 (Long Questions)	10 Marks each	2*10 = 20
C	Compulsory Case Study	15 Marks	15
		Total Marks	**50**

SECTION A

A1. Forty four percent of consumers with credit cards carry balances from month to month (bankrate.com, 2016). Four consumers with credit card are randomly selected.

a) What is the probability that all consumers carry a credit card balance?

b) What is the probability that fewer than two consumers carry a credit card balance?

c) Calculate the expected value, the variance and the standard distribution of this binomial distribution.

A2. Suppose that the number of inquiries arriving at a certain interactive system follows a Poisson distribution with arrival rate of 10 inquiries per minute. Find the probability of 6 inquiries arriving

a) in a 1-minute interval

b) in a 2-minute interval.

c) What is the expectation and the variance of the number of arrivals during each of these intervals?

A3. The average cost of a one bedroom apartment in town is $550 per month. What is the probability of randomly selecting a sample of 50 one bedroom apartments in this town and getting a sample mean of less than $530 if the population standard deviation is $100?

A4. Suppose a US car rental firm wants to estimate the average number of miles travelled per day by each of its cars rented in California. A random sample of 200 cars rented in California reveals that the sample mean travel distance per day is 80.0 miles, with a sample standard deviation of 15.3 miles. Compute a 95% confidence interval to estimate μ.

A5. Atlas Sporting Goods has implemented a special trade promotion for its propane stove and feels that the promotion should result in a price change for the consumer. Atlas knows that before the promotion began, the average retail price of the stove was $44.95, and the standard deviation was $5.75. Atlas samples 25 of its retailers after the promotion begins and finds the mean price for the stoves is now $42.95. At a 0.02 significance level, does atlas have reason to believe that the average retail price to the consumer has not changed?

SECTION B

B1. A construction company in Greater Noida, Gautam Budha Nagar, is struggling to sell condominiums. In order to attract buyers, the company has made numerous price reductions and better financing offers. Although condominiums were once listed for $300,000, the company believes that it will be able to get an average sale price of $210,000. Let the price of these condominiums in the next quarter be normally distributed with a standard deviation of $15,000.

a) What is the probability that the condominium will sell at a price (i) below $200,000 ? (ii) above $240,000?

b) The company is also trying to sell an artist's condo. Potential buyer will find the unusual features of this condo either pleasing or objectionable. The manager expects average sale price of this condo to be the same as others at $210,000, but with a higher standard deviation of $20,000. What is the probability that this condo will sell at a price (i) below $200,000?, (ii) above $240,000?

B2. A professor is trying to show his students the importance of quizzes even though 90% of the final grade is determined by the exams. He believes that the higher the quiz grade, the higher the final grade. A random sample of 10 students in his class was selected with the data given below.

Quiz marks (Out of 20)	10	15	12	16	13	18	20	17	14	15
Final exam marks (Out of 100)	70	92	88	86	72	90	100	95	97	90

a) State the dependent variable and the independent variable.

b) Calculate and Interpret the slope of the regression line.

B3. A company is evaluating the promotability of its employees that is, determining the proportion whose ability, training and supervisory experience qualify them for promotion to the next higher level of management. The human resources director tells the president that roughly 80 percent of the employees in the company are "promotable". The president assembles a special committee to assess the promotability of all employees. This committee conduct in depth interviews with 150 employees and finds that in its judgment only 70 percent of the sample are qualified for promotion.The president wants to test at the 0.05 significance level the hypotheses that 80 percent of the employees are Promotable.

SECTION C

Case # Unemployment Study

Each month the U.S. Bureau of Labor Statistics publishes a variety of unemployment statistics, including the number of individuals who are unemployed and the mean length of time the individuals have been unemployed. For November 2016, the Bureau of Labor statistics reported that the national mean length of time of unemployment was 14.6 weeks.

Age	Weeks	Age	Weeks	Age	Weeks	Age	Weeks
56	22	49	26	44	38	27	7
35	19	33	13	27	14	30	10
22	7	56	15	24	6	33	23
57	37	20	17	27	7	32	8
40	18	31	11	45	25	22	7
22	11	27	17	42	33	51	12

48	6	23	3	45	16	50	16
48	22	45	17	44	12	21	9
25	5	29	14	21	13	38	5
40	20	31	4	31	16	26	8
25	12	59	39	42	4	55	35
25	1	39	7	23	14		
59	33	35	12	51	31		

The mayor of Philadelphia requested a study on the status of unemployment in the Philadelphia area. A sample of 50 unemployed residents of Philadelphia included data on their age and the number of weeks without a job. A portion of the data collected in November 2016 follows.

Descriptive statistics to summarize the data.

Age		*Weeks*	
Mean	36.6	Mean	15.54
Median	34	Median	13.5
Mode	27	Mode	7
Sample Variance	142.6939	Sample Variance	98.53918
Kurtosis	-1.14515	Kurtosis	0.053711
Skewness	0.357283	Skewness	0.910766
Range	39	Range	38
Minimum	20	Minimum	1
Maximum	59	Maximum	39
Sum	1830	Sum	777
Count	50	Count	50

Managerial Report

1. Develop a 95% confidence interval estimate of the mean age of unemployed individuals in Philadelphia.
2. Conduct a hypothesis test to determine whether the mean duration of unemployment in Philadelphia is greater than the national mean duration of 14.6 weeks. Use a .01 level of significance. What is your conclusion?
3. Is there a relationship between the age of an unemployed individual and the number of weeks of unemployment? Explain using scatter plot diagram.

Turn Over

Some important Formulae

$$P(x) = \binom{n}{x} p^x q^{(n-x)} = \frac{n!}{x!(n-x)!} p^x q^{(n-x)} \qquad ; \mu = np \quad ; \sigma^2 = npq$$

$$P(x) = \frac{\mu^x e^{-\mu}}{x!} \text{ for } x = 1,2,3,... \qquad ; \qquad z = \frac{x - \mu}{\sigma}$$

$$\frac{\bar{X} - \mu}{\sigma/\sqrt{n}} \qquad \frac{\bar{X} - \mu}{s/\sqrt{n}} \qquad \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$$

$$\frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}} \qquad \frac{\bar{X} - \mu_0}{s/\sqrt{n}} \qquad \frac{(\hat{p} - p_0)}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

$$\bar{x} \pm z\alpha/2 \frac{\sigma}{\sqrt{n}} \qquad \bar{X} \pm t_{(\frac{\alpha}{2}, n-1)} \frac{S}{\sqrt{n}} \qquad n = \frac{(z\alpha/2)^2 \sigma^2}{E^2}$$

Finite Correction Factor : $\sqrt{\frac{N-n}{N-1}}$ $\qquad N\bar{X} \pm N\left(t_{\alpha/2,n-1}\right)\frac{S}{\sqrt{n}}\sqrt{\frac{(N-n)}{(N-1)}}$

$$Y_i = b_0 + b_1 X \qquad b_0 = \bar{y} - b_1 \bar{x}$$

$$b_1 = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}} \qquad b_1 = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

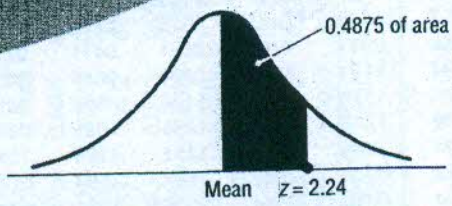
		p															
n	r	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50	r	n
2	0	0.3969	0.3844	0.3721	0.3600	0.3481	0.3364	0.3249	0.3136	0.3025	0.2916	0.2809	0.2704	0.2601	0.2500	2	
	1	0.4662	0.4712	0.4758	0.4800	0.4838	0.4872	0.4902	0.4928	0.4950	0.4968	0.4982	0.4992	0.4998	0.5000	1	
	2	0.1369	0.1444	0.1521	0.1600	0.1681	0.1764	0.1849	0.1936	0.2025	0.2116	0.2209	0.2304	0.2401	0.2500	0	2
3	0	0.2500	0.2383	0.2270	0.2160	0.2054	0.1951	0.1852	0.1756	0.1664	0.1575	0.1489	0.1406	0.1327	0.1250	3	
	1	0.4406	0.4382	0.4354	0.4320	0.4282	0.4239	0.4191	0.4140	0.4084	0.4024	0.3961	0.3894	0.3823	0.3750	2	
	2	0.2587	0.2686	0.2783	0.2880	0.2975	0.3069	0.3162	0.3252	0.3341	0.3428	0.3512	0.3594	0.3674	0.3750	1	
	3	0.0507	0.0549	0.0593	0.0640	0.0689	0.0741	0.0795	0.0852	0.0911	0.0973	0.1038	0.1106	0.1176	0.1250	0	3
4	0	0.1575	0.1478	0.1385	0.1296	0.1212	0.1132	0.1056	0.0983	0.0915	0.0850	0.0789	0.0731	0.0677	0.0625	4	
	1	0.3701	0.3623	0.3541	0.3456	0.3368	0.3278	0.3185	0.3091	0.2995	0.2897	0.2799	0.2700	0.2600	0.2500	3	
	2	0.3260	0.3330	0.3396	0.3456	0.3511	0.3560	0.3604	0.3643	0.3675	0.3702	0.3723	0.3738	0.3747	0.3750	2	
	3	0.1276	0.1361	0.1447	0.1536	0.1627	0.1719	0.1813	0.1908	0.2005	0.2102	0.2201	0.2300	0.2400	0.2500	1	
	4	0.0187	0.0209	0.0231	0.0256	0.0283	0.0311	0.0342	0.0375	0.0410	0.0448	0.0488	0.0531	0.0576	0.0625	0	4
5	0	0.0992	0.0916	0.0845	0.0778	0.0715	0.0656	0.0602	0.0551	0.0503	0.0459	0.0418	0.0380	0.0345	0.0312	5	
	1	0.2914	0.2808	0.2700	0.2592	0.2484	0.2376	0.2270	0.2164	0.2059	0.1956	0.1854	0.1755	0.1657	0.1562	4	
	2	0.3423	0.3441	0.3452	0.3456	0.3452	0.3442	0.3424	0.3400	0.3369	0.3332	0.3289	0.3240	0.3185	0.3125	3	
	3	0.2010	0.2109	0.2207	0.2304	0.2399	0.2492	0.2583	0.2671	0.2757	0.2838	0.2916	0.2990	0.3060	0.3125	2	
	4	0.0590	0.0646	0.0706	0.0768	0.0834	0.0902	0.0974	0.1049	0.1128	0.1209	0.1293	0.1380	0.1470	0.1562	1	
	5	0.0069	0.0079	0.0090	0.0102	0.0116	0.0131	0.0147	0.0165	0.0185	0.0206	0.0229	0.0255	0.0282	0.0312	0	5
6	0	0.0625	0.0568	0.0515	0.0467	0.0422	0.0381	0.0343	0.0308	0.0277	0.0248	0.0222	0.0198	0.0176	0.0156	6	
	1	0.2203	0.2089	0.1976	0.1866	0.1759	0.1654	0.1552	0.1454	0.1359	0.1267	0.1179	0.1095	0.1014	0.0937	5	
	2	0.3235	0.3201	0.3159	0.3110	0.3055	0.2994	0.2928	0.2856	0.2780	0.2699	0.2615	0.2527	0.2436	0.2344	4	
	3	0.2533	0.2616	0.2693	0.2765	0.2831	0.2891	0.2945	0.2992	0.3032	0.3065	0.3091	0.3110	0.3121	0.3125	3	
	4	0.1116	0.1202	0.1291	0.1382	0.1475	0.1570	0.1666	0.1763	0.1861	0.1958	0.2056	0.2153	0.2249	0.2344	2	
	5	0.0262	0.0295	0.0330	0.0369	0.0410	0.0455	0.0503	0.0554	0.0609	0.0667	0.0729	0.0795	0.0864	0.0937	1	
	6	0.0026	0.0030	0.0035	0.0041	0.0048	0.0055	0.0063	0.0073	0.0083	0.0095	0.0108	0.0122	0.0138	0.0156	0	6
7	0	0.0394	0.0352	0.0314	0.0280	0.0249	0.0221	0.0195	0.0173	0.0152	0.0134	0.0117	0.0103	0.0090	0.0078	7	
	1	0.1619	0.1511	0.1407	0.1306	0.1211	0.1119	0.1032	0.0950	0.0872	0.0798	0.0729	0.0664	0.0604	0.0547	6	
	2	0.2853	0.2778	0.2698	0.2613	0.2524	0.2431	0.2336	0.2239	0.2140	0.2040	0.1940	0.1840	0.1740	0.1641	5	
	3	0.2793	0.2838	0.2875	0.2903	0.2923	0.2934	0.2937	0.2932	0.2918	0.2897	0.2867	0.2830	0.2786	0.2734	4	
	4	0.1640	0.1739	0.1838	0.1935	0.2031	0.2125	0.2216	0.2304	0.2388	0.2468	0.2543	0.2612	0.2676	0.2734	3	
	5	0.0578	0.0640	0.0705	0.0774	0.0847	0.0923	0.1003	0.1086	0.1172	0.1261	0.1353	0.1447	0.1543	0.1641	2	
	6	0.0113	0.0131	0.0150	0.0172	0.0196	0.0223	0.0252	0.0284	0.0320	0.0358	0.0400	0.0445	0.0494	0.0547	1	
	7	0.0009	0.0011	0.0014	0.0016	0.0019	0.0023	0.0027	0.0032	0.0037	0.0044	0.0051	0.0059	0.0068	0.0078	0	7
n	r	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	r	n
		p															

Binomial probabilities

Poisson Probabilities

	λ														
x	8.0	8.5	9.0	9.5	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0
0	.0003	.0002	.0001	.0001	—	—	—	—	—	—	—	—	—	—	—
1	.0027	.0017	.0011	.0007	.0005	.0002	.0001	—	—	—	—	—	—	—	—
2	.0107	.0074	.0050	.0034	.0023	.0010	.0004	.0002	.0001	—	—	—	—	—	—
3	.0286	.0208	.0150	.0107	.0076	.0037	.0018	.0008	.0004	.0002	.0001	—	—	—	—
4	.0573	.0443	.0337	.0254	.0189	.0102	.0053	.0027	.0013	.0006	.0003	.0001	.0001	—	—
5	.0916	.0752	.0607	.0483	.0378	.0224	.0127	.0070	.0037	.0019	.0010	.0005	.0002	.0001	.0001
6	.1221	.1066	.0911	.0764	.0631	.0411	.0255	.0152	.0087	.0048	.0026	.0014	.0007	.0004	.0002
7	.1396	.1294	.1171	.1037	.0901	.0646	.0437	.0281	.0174	.0104	.0060	.0034	.0019	.0010	.0005
8	.1396	.1375	.1318	.1232	.1126	.0888	.0655	.0457	.0304	.0194	.0120	.0072	.0042	.0024	.0013
9	.1241	.1299	.1318	.1300	.1251	.1085	.0874	.0661	.0473	.0324	.0213	.0135	.0083	.0050	.0029
10	.0993	.1104	.1186	.1235	.1251	.1194	.1048	.0859	.0663	.0486	.0341	.0230	.0150	.0095	.0058
11	.0722	.0853	.0970	.1067	.1137	.1194	.1144	.1015	.0844	.0663	.0496	.0355	.0245	.0164	.0106
12	.0481	.0604	.0728	.0844	.0948	.1094	.1144	.1099	.0984	.0829	.0661	.0504	.0368	.0259	.0176
13	.0296	.0395	.0504	.0617	.0729	.0926	.1056	.1099	.1060	.0956	.0814	.0658	.0509	.0378	.0271
14	.0169	.0240	.0324	.0419	.0521	.0728	.0905	.1021	.1060	.1024	.0930	.0800	.0655	.0514	.0387
15	.0090	.0136	.0194	.0265	.0347	.0534	.0724	.0885	.0989	.1024	.0992	.0906	.0786	.0650	.0516
16	.0045	.0072	.0109	.0157	.0217	.0367	.0543	.0719	.0866	.0960	.0992	.0963	.0884	.0772	.0646
17	.0021	.0036	.0058	.0088	.0128	.0237	.0383	.0550	.0713	.0847	.0934	.0963	.0936	.0863	.0760
18	.0009	.0017	.0029	.0046	.0071	.0145	.0255	.0397	.0554	.0706	.0830	.0909	.0936	.0911	.0844
19	.0004	.0008	.0014	.0023	.0037	.0084	.0161	.0272	.0409	.0557	.0699	.0814	.0887	.0911	.0888
20	.0002	.0003	.0006	.0011	.0019	.0046	.0097	.0177	.0286	.0418	.0559	.0692	.0798	.0866	.0888
21	.0001	.0001	.0003	.0005	.0009	.0024	.0055	.0109	.0191	.0299	.0426	.0560	.0684	.0783	.0846
22	—	.0001	.0001	.0002	.0004	.0012	.0030	.0065	.0121	.0204	.0310	.0433	.0560	.0676	.0769
23	—	—	—	.0001	.0002	.0006	.0016	.0037	.0074	.0133	.0216	.0320	.0438	.0559	.0669
24	—	—	—	—	.0001	.0003	.0008	.0020	.0043	.0083	.0144	.0226	.0328	.0442	.0557
25	—	—	—	—	—	.0001	.0004	.0010	.0024	.0050	.0092	.0154	.0237	.0336	.0446
26	—	—	—	—	—	—	.0002	.0005	.0013	.0029	.0057	.0101	.0164	.0246	.0343
27	—	—	—	—	—	—	.0001	.0002	.0007	.0016	.0034	.0063	.0109	.0173	.0254
28	—	—	—	—	—	—	—	.0001	.0003	.0009	.0019	.0038	.0070	.0117	.0181
29	—	—	—	—	—	—	—	.0001	.0002	.0004	.0011	.0023	.0044	.0077	.0125
30	—	—	—	—	—	—	—	—	.0001	.0002	.0006	.0013	.0026	.0049	.0083
31	—	—	—	—	—	—	—	—	—	.0001	.0003	.0007	.0015	.0030	.0054
32	—	—	—	—	—	—	—	—	—	.0001	.0001	.0004	.0009	.0018	.0034
33	—	—	—	—	—	—	—	—	—	—	.0001	.0002	.0005	.0010	.0020
34	—	—	—	—	—	—	—	—	—	—	—	.0001	.0002	.0006	.0012
35	—	—	—	—	—	—	—	—	—	—	—	—	.0001	.0003	.0007
36	—	—	—	—	—	—	—	—	—	—	—	—	.0001	.0002	.0004
37	—	—	—	—	—	—	—	—	—	—	—	—	—	.0001	.0002
38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.0001
39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.0001

Appendix Tables

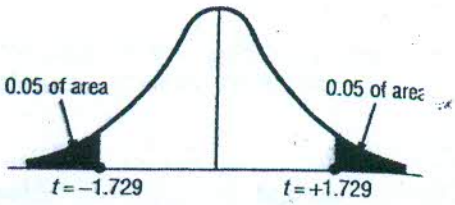


EXAMPLE: TO FIND THE AREA UNDER THE CURVE BETWEEN THE MEAN AND A POINT 2.24 STANDARD DEVIATIONS TO THE RIGHT OF THE MEAN, LOOK UP THE VALUE OPPOSITE 2.2 AND UNDER 0.04 IN THE TABLE; 0.4875 OF THE AREA UNDER THE CURVE LIES BETWEEN THE MEAN AND A z VALUE OF 2.24.

APPENDIX TABLE 1 AREAS UNDER THE STANDARD NORMAL PROBABILITY DISTRIBUTION BETWEEN THE MEAN AND POSITIVE VALUES OF z

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

EXAMPLE: TO FIND THE VALUE OF t THAT CORRESPONDS TO AN AREA OF 0.10 IN BOTH TAILS OF THE DISTRIBUTION COMBINED, WHEN THERE ARE 19 DEGREES OF FREEDOM, LOOK UNDER THE 0.10 COLUMN, AND PROCEED DOWN TO THE 19 DEGREES OF FREEDOM ROW; THE APPROPRIATE t VALUE THERE IS 1.729.



APPENDIX TABLE 2 AREAS IN BOTH TAILS COMBINED FOR STUDENT'S t DISTRIBUTION

Degrees of Freedom	Area in Both Tails Combined			
	0.10	0.05	0.02	0.01
1	6.314	12.706	31.821	63.657
2	2.920	4.303	6.965	9.925
3	2.353	3.182	4.541	5.841
4	2.132	2.776	3.747	4.604
5	2.015	2.571	3.365	4.032
6	1.943	2.447	3.143	3.707
7	1.895	2.365	2.998	3.499
8	1.860	2.306	2.896	3.355
9	1.833	2.262	2.821	3.250
10	1.812	2.228	2.764	3.169
11	1.796	2.201	2.718	3.106
12	1.782	2.179	2.681	3.055
13	1.771	2.160	2.650	3.012
14	1.761	2.145	2.624	2.977
15	1.753	2.131	2.602	2.947
16	1.746	2.120	2.583	2.921
17	1.740	2.110	2.567	2.898
18	1.734	2.101	2.552	2.878
19	1.729	2.093	2.539	2.861
20	1.725	2.086	2.528	2.845
21	1.721	2.080	2.518	2.831
22	1.717	2.074	2.508	2.819
23	1.714	2.069	2.500	2.807
24	1.711	2.064	2.492	2.797
25	1.708	2.060	2.485	2.787
26	1.706	2.056	2.479	2.779
27	1.703	2.052	2.473	2.771
28	0.701	2.048	2.467	2.763
29	1.699	2.045	2.462	2.756
30	1.697	2.042	2.457	2.750
40	1.684	2.021	2.423	2.704
60	1.671	2.000	2.390	2.660
120	1.658	1.980	2.358	2.617
Normal Distribution	1.645	1.960	2.326	2.576