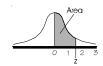
Critical Value Tables

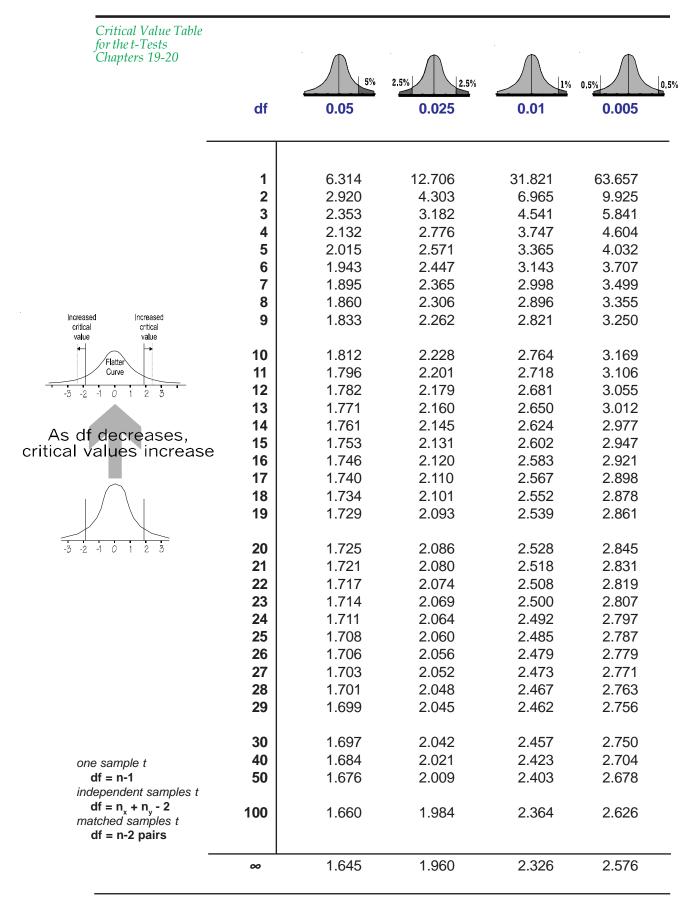
z-Distribution Table

Critical Value Table for the z-Test Chapters 17-19



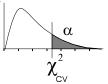
0.0	Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09				
0.2	0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359				
0.3 0.1179 0.1217 0.1255 0.1293 0.1331 0.1388 0.1443 0.1443 0.1443 0.1414 0.1517 0.4 0.1554 0.1591 0.1628 0.1664 0.1700 0.1736 0.1772 0.1808 0.1844 0.1879 0.5 0.1915 0.1950 0.1985 0.2019 0.2054 0.2088 0.2127 0.2549 0.6 0.2257 0.2291 0.2357 0.2389 0.2422 0.2484 0.22486 0.2517 0.2549 0.7 0.2580 0.2611 0.2642 0.2673 0.2704 0.2734 0.2794 0.2283 0.2862 0.8 0.2881 0.2910 0.2939 0.2967 0.2995 0.3023 0.3051 0.3078 0.3166 0.3186 0.3212 0.32338 0.3571 0.3577 0.3599 0.3621 1.1 0.3643 0.3686 0.3708 0.3729 0.3749 0.3770 0.3790 0.3810 0.3571 0.3599 0.3621 </th <th>0.1</th> <th>0.0398</th> <th>0.0438</th> <th>0.0478</th> <th>0.0517</th> <th>0.0557</th> <th>0.0596</th> <th>0.0636</th> <th>0.0675</th> <th>0.0714</th> <th>0.0753</th>	0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753				
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 0.2734 0.2764 0.2794 0.2794 0.2794 0.2794 0.2784 0.2861 0.2817 0.2899 0.3023 0.3051 0.3078 0.3106 0.3133 0.3166 0.3212 0.3289 0.3233 0.3051 0.3078 0.3106 0.3133 0.9 0.3159 0.3186 0.3241 0.3283 0.3264 0.3289 0.3315 0.3340 0.3166 0.3708 0.3729 0.3749 0.3770 0.3790 0.3810 0.3831 1.2 0.3849 0.3869 0.3888 0.3907 0.3925 0.3944 0.3962 0.3980 0.3997 0.4011 1.3 0.4032 0.4040 0.	0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141				
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 0.2466 0.2517 0.2549 0.7 0.2580 0.2611 0.2642 0.2673 0.2704 0.2734 0.2764 0.2794 0.2784 0.2784 0.3036 0.30378 0.3108 0.3103 0.2995 0.2995 0.3023 0.3051 0.3078 0.3106 0.3133 0.99 0.3159 0.3186 0.3212 0.3238 0.3264 0.3289 0.3315 0.3340 0.3365 0.3380 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 0.3688 0.3907 0.3925 0.3941 0.3770 0.3790 0.3810 0.3830 1.2 0.3340 0.3620 0.49390 0	0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517				
0.6 0.2257 0.2291 0.2324 0.2357 0.2389 0.2422 0.2454 0.2486 0.22617 0.2517 0.2580 0.7 0.2580 0.2811 0.2642 0.2673 0.2704 0.2734 0.2764 0.2794 0.2852 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 0.3508 0.3577 0.3770 0.3770 0.3790 0.3810 0.3831 1.2 0.3843 0.3665 0.3686 0.3907 0.3925 0.3944 0.3962 0.3980 0.3997 1.2 0.3432 0.4409 0.4082 0.4092 0.4115 0.4131 0.4142 0.4417 1.5 0.4332 0.4345	0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879				
0.7 0.2580 0.2611 0.2642 0.2673 0.2704 0.2764 0.2794 0.2823 0.2823 0.2852 0.8 0.2881 0.2910 0.2939 0.2967 0.2995 0.3023 0.3051 0.3050 0.3160 0.3163 0.3133 0.9 0.3159 0.3180 0.3212 0.3238 0.3264 0.3289 0.3340 0.3365 0.3380 0.3831 0.3564 0.3577 0.3599 0.3621 1.1 0.3643 0.3666 0.3686 0.3888 0.3897 0.3779 0.3790 0.3810 0.3831 1.2 0.3849 0.3869 0.3888 0.3897 0.4015 0.3411 0.4147 0.4162 0.4417 0.4162 0.4417 0.4162 0.4417 0.4162 0.4418 0.4412 0.417 0.4172 0.4312 0.4311 0.4117 0.4162 0.4411 0.4142 0.4411 0.4162 0.4411 0.4412 0.4411 0.4412 0.4411 0.4416 0.4411	0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224				
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 0.3369 1.0 0.3413 0.3438 0.3461 0.3485 0.3508 0.3531 0.3554 0.3770 0.3790 0.3810 0.3838 1.1 0.3643 0.3665 0.3686 0.3708 0.3729 0.3749 0.3770 0.3790 0.3810 0.3838 1.2 0.3849 0.3666 0.3686 0.3907 0.3925 0.3944 0.3962 0.3980 0.3997 0.4015 1.3 0.4032 0.4049 0.4066 0.4029 0.4115 0.4131 0.4147 0.4162 0.4177 1.4 0.4432 0.4430 0.4436 0.4270 0.4229 0.4206 0.4279 0.4279 0.4290 0.4417 1.6 0.4332 0.4434	0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549				
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 0.3488 0.3461 0.3485 0.3508 0.3531 0.3577 0.3599 0.3611 1.1 0.3643 0.3665 0.3886 0.3708 0.3729 0.3749 0.3770 0.3990 0.3990 0.3930 0.3990 0.4902 0.4902 0.4909 0.4177 0.4176 0.4177 0.4176 0.4292 0.4292 0.4292 0.4306 0.4319 1.5	0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852				
1.0	0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133				
1.1	0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389				
1.2	1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621				
1.3	1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830				
1.4	1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015				
1.5	1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177				
1.6	1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319				
1.7	1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441				
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 0.4780 0.4808 0.4812 0.4817 2.1 0.4821 0.4826 0.4830 0.4834 0.4838 0.4842 0.4846 0.4850 0.4857 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 0.4913 0.4913 0.4913 0.4913 0.4913 0.4913 0.4913 0.4914 0.4922 0.4927 0.4929 0.4931 0.4932 0.4934 0.4933 0.4934 0.4933 0.4931 0.4932 0.4931 0.4931 0.4931 0.4932 0.4933 0.4931 0.	1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545				
1.9 0.4713 0.4719 0.4726 0.4732 0.4738 0.4744 0.4750 0.4766 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 0.4909 0.4911 0.4913 0.4932 0.4931 0.4932 0.4934 0.4948 0.4949 0.4931 0.4932 0.4933 0.4933 0.4934 0.4948 0.4949 0.4945 0.4962 0.4963	1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633				
2.0															
2.1	1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767				
2.2	2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817				
2.3															
2.4															
2.5															
2.6	2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936				
2.7 2.8 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 0.4985 0.4985 0.4985 0.4986 0.4986 3.0 0.4987 0.4987 0.4987 0.4988 0.4988 0.4988 0.4989 0.4989 0.4990 0.4990 3.1 0.49903 3.2 0.49931 3.3 0.49952 3.4 0.49962 Example The horizontal shading above represents z = 1.9 The vertical shading above represents z = 1.96 Where they meet represents z = 1.96 Where they meet represents z = 1.96 The area between the mean and z = 1.96 equals 0.4750.	2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952				
2.8						0.4959									
2.9				0.4967											
3.0							0.4978								
3.1	2.9	0.4981	0.4982	0.4982	0.4983	0.4983	0.4984	0.4985	0.4985	0.4986	0.4986				
3.2			0.4987	0.4987	0.4988	0.4988	0.4988	0.4989	0.4989	0.4990	0.4990				
3.3		0.49903									_				
The horizontal shading above represents z = 1.9 The vertical shading above represents z = 1.9 The vertical shading above represents z = 1.96 Where they meet represents z = 1.96 Where they meet represents z = 1.96 The area between the mean and z = 1.96 equals 0.4750.	3.2	0.49931					,	Evomplo							
The vertical shading above represents z = +.06 Where they meet represents z = 1.96 Where they meet represents z = 1.96 The area between the mean and z = 1.96 equals 0.4750.						n 1 ·				1					
3.5 0.49977 3.6 0.49984 3.7 0.49989 3.8 0.49993 3.9 0.49995 Where they meet represents z = 1.96 The area between the mean and z = 1.96 equals 0.4750 .	3.4	0.49962													
3.6 0.49984 3.7 0.49989 3.8 0.49993 3.9 0.49995 The area between the mean and z = 1.96 equals 0.4750 .					7										
3.7 0.49989 The area between the mean and z = 1.96 equals 0.4750.						Where they meet represents $z = 1.96$									
3.8 0.49993 The area between the mean and $z = 1.96$ equals 0.4750.								=							
3.8 0.49995 mean and $z = 1.96$ equals 0.4750.							The ar	ea hetwa	on the						
1						144.0				750					
4.0 1 0.50000						med	ın ana Z =	- 1.90 eg	_[uuis V.4]	30.					
4.0 U.50000	4.0	0.50000													

t-Distribution Table



χ^2 Distribution Table

Critical Value Table for the Chi-Square Tests Chapter 23



				$\chi_{^{\text{C}^{\wedge}}}$
df	0.05	0.025	0.01	0.005
1	3.84	5.02	6.63	7.88
2	5.99	7.38	9.21	10.60
3	7.82	9.35	11.35	12.84
4	9.49	11.14	13.28	14.86
5	11.07	12.83	15.09	16.75
6	12.59	14.45	16.81	18.55
7	14.07	16.01	18.48	20.28
8	15.51	17.54	20.09	21.96
9	16.92	19.02	21.66	23.59
10	18.31	20.48	23.21	25.19
11	19.68	21.92	24.72	26.75
12	21.03	23.34	26.21	28.30
13	22.36	24.74	27.69	29.82
14	23.69	26.12	29.14	31.31
15	25.00	27.49	30.58	32.80
16	26.30	28.85	32.00	34.27
17	27.59	30.19	33.41	35.72
18	28.87	31.53	34.81	37.15
19	30.14	32.85	36.19	38.58
20	31.41	34.17	37.56	40.00
21	32.67	35.48	38.93	41.40
22	33.93	36.78	40.29	42.80
23	35.17	38.08	41.64	44.18
24	36.42	39.37	42.98	45.56
25	37.65	40.65	44.32	46.93
26	38.89	41.92	45.64	48.29
27	40.11	43.20	46.96	49.64
28	41.34	44.46	48.28	50.99
29	42.56	45.72	49.59	52.34
30	43.77	46.98	50.89	53.67
40	55.75	59.34	63.71	66.80
50	67.50	71.42	76.17	79.52
100	124.34	129.56	135.82	140.19

Goodness of Fit

df = k-1

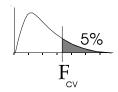
Test of Independence

df = (r-1)(c-1)

F-Distribution Table

Critical Value Table for the Analysis of Variance Test Chapter 21

 $\alpha = 0.05$



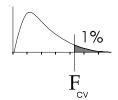
Degrees of Freedom for the F-Ratio numera-

		1	<i>tor</i> 2	3	4	5	6	7	8	9	10
	1	161.4	199.5	215.8	224.8	230.0	233.8	236.5	238.6	240.1	242.1
	2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40
	3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79
	4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96
ominator	5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74
	6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06
	7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64
	8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35
	9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14
: F-Ratio den	10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98
	11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85
	12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75
	13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67
	14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60
Degrees of Freedom for the F-Ratio <mark>denominator</mark>	15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54
	16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49
	17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45
	18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41
	19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38
Degrees of Fr	20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35
	22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30
	24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25
	26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22
	28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19
	30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16
	40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08
	50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03
	60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99
	120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91
	200	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98	1.93	1.88
	500	3.86	3.01	2.62	2.39	2.23	2.12	2.03	1.96	1.90	1.85
,	1000	3.85	3.01	2.61	2.38	2.22	2.11	2.02	1.95	1.89	1.84

F-Distribution Table

Critical Value Table for the Analysis of Variance Test Chapter 21

 $\alpha = 0.01$



Degrees of Freedom for the F-Ratio numera-

			8	J	,					
	1	10r 2	3	4	5	6	7	8	9	10
1 2 3 4	4048 4 98.50 34.12 21.20	993 5 99.01 30.82 18.00	377 5 99.15 29.46 16.69	577 5 99.23 28.71 15.98	668 5 99.30 28.24 15.52	924 5 99.33 27.91 15.21	992 6 99.35 27.67 14.98	096 6 99.39 27.49 14.80	132 6 99.40 27.34 14.66	168 99.43 27.23 14.55
5 6 7 8 9	16.26 13.75 12.25 11.26 10.56	13.27 10.92 9.55 8.65 8.02	12.06 9.78 8.45 7.59 6.99	11.39 9.15 7.85 7.01 6.42	10.97 8.75 7.46 6.63 6.06	10.67 8.47 7.19 6.37 5.80	10.46 8.26 6.99 6.18 5.61	10.29 8.10 6.84 6.03 5.47	10.16 7.98 6.72 5.91 5.35	10.05 7.87 6.62 5.81 5.26
10 11 12 13 14	10.04 9.65 9.33 9.07 8.86	7.56 7.21 6.93 6.70 6.51	6.55 6.22 5.95 5.74 5.56	5.99 5.67 5.41 5.21 5.04	5.64 5.32 5.06 4.86 4.69	5.39 5.07 4.82 4.62 4.46	5.20 4.89 4.64 4.44 4.28	5.06 4.74 4.50 4.30 4.14	4.94 4.63 4.39 4.19 4.03	4.85 4.54 4.30 4.10 3.94
15 16 17 18 19	8.68 8.53 8.40 8.29 8.18	6.36 6.23 6.11 6.01 5.93	5.42 5.29 5.18 5.09 5.01	4.89 4.77 4.67 4.58 4.50	4.56 4.44 4.34 4.25 4.17	4.32 4.20 4.10 4.01 3.94	4.14 4.03 3.93 3.84 3.77	4.00 3.89 3.79 3.71 3.63	3.89 3.78 3.68 3.60 3.52	3.80 3.69 3.59 3.51 3.43
20 22 24 26 28	8.10 7.95 7.82 7.72 7.64	5.85 5.72 5.61 5.53 5.45	4.94 4.82 4.72 4.64 4.57	4.43 4.31 4.22 4.14 4.07	4.10 3.99 3.90 3.82 3.75	3.87 3.76 3.67 3.59 3.53	3.70 3.59 3.50 3.42 3.36	3.56 3.45 3.36 3.29 3.23	3.46 3.35 3.26 3.18 3.12	3.37 3.26 3.17 3.09 3.03
30 40 50 60	7.56 7.31 7.17 7.08	5.39 5.18 5.06 4.98	4.51 4.31 4.20 4.13	4.02 3.83 3.72 3.65	3.70 3.51 3.41 3.34	3.47 3.29 3.19 3.12	3.30 3.12 3.02 2.95	3.17 2.99 2.89 2.82	3.07 2.89 2.78 2.72	2.98 2.80 2.70 2.63
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47
200	6.76	4.71	3.88	3.41	3.11	2.89	2.73	2.60	2.50	2.41
500	6.69	4.65	3.82	3.36	3.05	2.84	2.68	2.55	2.44	2.36
1000	6.67	4.63	3.80	3.34	3.04	2.82	2.66	2.53	2.43	2.34
	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 22 24 26 28 30 40 50 60 60 60 60 60 60 60 60 60 60 60 60 60	1 4048 4 2 98.50 34.12 4 21.20 5 16.26 6 13.75 7 12.25 8 11.26 9 10.56 10 10.04 11 9.65 12 9.33 13 9.07 14 8.86 15 8.68 8.53 17 8.40 8.29 19 8.18 20 8.10 7.95 7.82 7.64 7.31 30 7.56 40 7.31 50 7.17 60 7.08 120 6.85 200 6.76 500 6.69	1 4048 4993 5 98.50 99.01 3 34.12 30.82 4 21.20 18.00 5 16.26 13.27 6 13.75 10.92 7 12.25 9.55 8 11.26 8.65 9 10.56 8.02 10 10.04 7.56 7.21 12 9.33 6.93 13 9.07 6.70 14 8.86 6.51 15 8.68 6.36 6.51 15 8.68 6.36 6.51 15 8.40 6.11 8.29 6.01 18 8.29 6.01 19 8.18 5.93 20 8.10 5.85 7.22 7.95 5.72 7.22 7.82 5.61 7.72 5.53 28 7.64 5.45 5.45 30 7.56 5.39 40 7.31 5.18 50 7.17 5.06 60 7.08 4.98 120 6.85 4.79 4.98 4.98 4.95 4.65	1 2 3 1 4048 4993 5377 5 2 98.50 99.01 99.15 3 34.12 30.82 29.46 4 21.20 18.00 16.69 5 16.26 13.27 12.06 6 13.75 10.92 9.78 7 12.25 9.55 8.45 8 11.26 8.65 7.59 9 10.56 8.02 6.99 10 10.04 7.56 6.55 11 9.65 7.21 6.22 12 9.33 6.93 5.95 13 9.07 6.70 5.74 14 8.86 6.51 5.56 15 8.68 6.36 5.42 16 8.53 6.23 5.29 17 8.40 6.11 5.18 18 8.29 6.01 5.09 19 8.18	1 2 3 4 1 4048 4993 5377 5577 5 2 98.50 99.01 99.15 99.23 3 34.12 30.82 29.46 28.71 4 21.20 18.00 16.69 15.98 5 16.26 13.27 12.06 11.39 6 13.75 10.92 9.78 9.15 7 12.25 9.55 8.45 7.85 8 11.26 8.65 7.59 7.01 9 10.56 8.02 6.99 6.42 10 10.04 7.56 6.55 5.99 11 9.65 7.21 6.22 5.67 12 9.33 6.93 5.95 5.41 13 9.07 6.70 5.74 5.21 14 8.86 6.51 5.56 5.04 15 8.68 6.36 5.42 4.89	1 2 3 4 5 1 4048 4993 5377 5577 5668 5 2 98.50 99.01 99.15 99.23 99.30 3 34.12 30.82 29.46 28.71 28.24 4 21.20 18.00 16.69 15.98 15.52 5 16.26 13.27 12.06 11.39 10.97 6 13.75 10.92 9.78 9.15 8.75 7 12.25 9.55 8.45 7.85 7.46 8 11.26 8.65 7.59 7.01 6.63 9 10.56 8.02 6.99 6.42 6.06 10 10.04 7.56 6.55 5.99 5.64 11 9.65 7.21 6.22 5.67 5.32 12 9.33 6.93 5.95 5.41 5.06 13 9.07 6.70 5.74 <th< th=""><th>1 2 3 4 5 6 1 4048 4993 5377 5577 5668 5924 5 2 98.50 99.01 99.15 99.23 99.30 99.33 3 34.12 30.82 29.46 28.71 28.24 27.91 4 21.20 18.00 16.69 15.98 15.52 15.21 5 16.26 13.27 12.06 11.39 10.97 10.67 6 13.75 10.92 9.78 9.15 8.75 8.47 7 12.25 9.55 8.45 7.85 7.46 7.19 8 11.26 8.65 7.59 7.01 6.63 6.37 9 10.56 8.02 6.99 6.42 6.06 5.80 10 10.04 7.56 6.55 5.99 5.64 5.39 11 9.65 7.21 6.22 5.67 5.32 5.07</th><th>1 2 3 4 5 6 7 1 4048 4993 5377 5577 5668 5924 5992 6 2 98.50 99.01 99.15 99.23 99.30 99.33 99.35 3 34.12 30.82 29.46 28.71 28.24 27.91 27.67 4 21.20 18.00 16.69 15.98 15.52 15.21 14.98 5 16.26 13.27 12.06 11.39 10.97 10.67 10.46 6 13.75 10.92 9.78 9.15 8.75 8.47 8.26 7 12.25 9.55 8.45 7.85 7.46 7.19 6.99 8 11.26 8.65 7.59 7.01 6.63 6.37 6.18 9 10.56 8.02 6.99 6.42 6.06 5.80 5.61 10 10.04 7.56 6.55 5.99</th><th>1 2 3 4 5 6 7 8 1 4048 4993 5377 5577 5668 5924 5992 6096 6 98.50 99.01 99.15 99.23 99.30 99.33 99.35 99.39 3 34.12 30.82 29.46 28.71 28.24 27.91 27.67 27.49 4 21.20 18.00 16.69 15.98 15.52 15.21 14.98 14.80 5 16.26 13.27 12.06 11.39 10.97 10.67 10.46 10.29 10.67 10.46 10.29 6 13.75 10.92 9.78 9.15 8.75 8.47 8.26 8.10 8.10 6.37 6.18 6.03 7 12.25 9.55 8.45 7.59 7.01 6.63 6.37 6.18 6.03 9 10.56 8.02 6.99 6.42 6.06 5.80 5.61 5.47 10 10.04 7.56 6.55 5.99 5.64 5.39 5.20 5.06 11 9.65 7.21 6.22 5.67 5.32 5.07 4.89 4.74 12 9.33 6.93 5.95 5.41 5.06 4.82 4.64 4.50 13 9.07 6.70 5.74 5.21 4.86 4.62 4.44 4.30 14 8.86 6.51 5.56 5.04 4.69 4.46 4.28 4.14 15 8.68 6.36 5.42 4.89 4.56 4.32 4.14 4.00 16 8.53 6.23 5.29 4.77 4.44 4.20 4.03 3.89 17 8.40 6.11 5.18 4.67 4.34 4.10 3.83 3.79 3.63 18 8.29 6.01 5.09 4.58 4.25 4.01 3.84 3.71 19 8.18 5.93 5.01 4.50 4.17 3.94 3.77 3.63 20 8.10 5.85 4.94 4.43 4.10 3.87 3.70 3.56 21</th><th>1 2 3 4 5 6 7 8 9 1 4048 4993 5377 5577 5668 5924 5992 6096 6132 6 2 98.50 99.01 99.15 99.23 99.30 99.33 99.39 99.39 99.40 3 34.12 30.82 29.46 28.71 28.24 27.91 27.67 27.49 27.34 4 21.20 18.00 16.69 15.98 15.52 15.21 14.98 14.80 14.66 5 16.26 13.27 12.06 11.39 10.97 10.67 10.46 10.29 10.16 6 13.75 10.92 9.78 9.15 8.75 8.47 8.26 8.10 7.98 7 12.25 9.55 8.45 7.59 7.01 6.63 6.79 6.42 6.06 5.80 5.61 5.47 5.35 10 10.04</th></th<>	1 2 3 4 5 6 1 4048 4993 5377 5577 5668 5924 5 2 98.50 99.01 99.15 99.23 99.30 99.33 3 34.12 30.82 29.46 28.71 28.24 27.91 4 21.20 18.00 16.69 15.98 15.52 15.21 5 16.26 13.27 12.06 11.39 10.97 10.67 6 13.75 10.92 9.78 9.15 8.75 8.47 7 12.25 9.55 8.45 7.85 7.46 7.19 8 11.26 8.65 7.59 7.01 6.63 6.37 9 10.56 8.02 6.99 6.42 6.06 5.80 10 10.04 7.56 6.55 5.99 5.64 5.39 11 9.65 7.21 6.22 5.67 5.32 5.07	1 2 3 4 5 6 7 1 4048 4993 5377 5577 5668 5924 5992 6 2 98.50 99.01 99.15 99.23 99.30 99.33 99.35 3 34.12 30.82 29.46 28.71 28.24 27.91 27.67 4 21.20 18.00 16.69 15.98 15.52 15.21 14.98 5 16.26 13.27 12.06 11.39 10.97 10.67 10.46 6 13.75 10.92 9.78 9.15 8.75 8.47 8.26 7 12.25 9.55 8.45 7.85 7.46 7.19 6.99 8 11.26 8.65 7.59 7.01 6.63 6.37 6.18 9 10.56 8.02 6.99 6.42 6.06 5.80 5.61 10 10.04 7.56 6.55 5.99	1 2 3 4 5 6 7 8 1 4048 4993 5377 5577 5668 5924 5992 6096 6 98.50 99.01 99.15 99.23 99.30 99.33 99.35 99.39 3 34.12 30.82 29.46 28.71 28.24 27.91 27.67 27.49 4 21.20 18.00 16.69 15.98 15.52 15.21 14.98 14.80 5 16.26 13.27 12.06 11.39 10.97 10.67 10.46 10.29 10.67 10.46 10.29 6 13.75 10.92 9.78 9.15 8.75 8.47 8.26 8.10 8.10 6.37 6.18 6.03 7 12.25 9.55 8.45 7.59 7.01 6.63 6.37 6.18 6.03 9 10.56 8.02 6.99 6.42 6.06 5.80 5.61 5.47 10 10.04 7.56 6.55 5.99 5.64 5.39 5.20 5.06 11 9.65 7.21 6.22 5.67 5.32 5.07 4.89 4.74 12 9.33 6.93 5.95 5.41 5.06 4.82 4.64 4.50 13 9.07 6.70 5.74 5.21 4.86 4.62 4.44 4.30 14 8.86 6.51 5.56 5.04 4.69 4.46 4.28 4.14 15 8.68 6.36 5.42 4.89 4.56 4.32 4.14 4.00 16 8.53 6.23 5.29 4.77 4.44 4.20 4.03 3.89 17 8.40 6.11 5.18 4.67 4.34 4.10 3.83 3.79 3.63 18 8.29 6.01 5.09 4.58 4.25 4.01 3.84 3.71 19 8.18 5.93 5.01 4.50 4.17 3.94 3.77 3.63 20 8.10 5.85 4.94 4.43 4.10 3.87 3.70 3.56 21	1 2 3 4 5 6 7 8 9 1 4048 4993 5377 5577 5668 5924 5992 6096 6132 6 2 98.50 99.01 99.15 99.23 99.30 99.33 99.39 99.39 99.40 3 34.12 30.82 29.46 28.71 28.24 27.91 27.67 27.49 27.34 4 21.20 18.00 16.69 15.98 15.52 15.21 14.98 14.80 14.66 5 16.26 13.27 12.06 11.39 10.97 10.67 10.46 10.29 10.16 6 13.75 10.92 9.78 9.15 8.75 8.47 8.26 8.10 7.98 7 12.25 9.55 8.45 7.59 7.01 6.63 6.79 6.42 6.06 5.80 5.61 5.47 5.35 10 10.04

$Wilcoxin \ W_{_s} \ Distribution \ Table$

Critical Value Table for the Wilcoxin Rank-Sum Ordinal Test Chapter 24

		$N_{_{I}}$	= 5			$N_{_{I}}$	= 6	
N_2	0.5	1.0	2.5	5.0%	0.5	1.0	2.5	5.0%
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	15 16 16 17 18 19 20 21 22 22 23 24 25 26 27 28 29 29 30 31 32	16 17 16 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36	17 18 18 21 22 23 24 26 27 28 29 30 32 33 34 35 37 38 39 40 42	19 20 21 23 24 26 27 28 30 31 33 34 35 37 38 40 41 43 44 45 47	23 24 25 26 27 28 30 31 32 33 34 36 37 38 39 40 42 43 44 45	24 25 27 28 29 30 32 33 34 36 37 39 40 41 43 44 45 47 48 50	26 27 29 31 32 34 35 37 38 40 42 43 45 46 48 50 51 53 54 56	28 29 31 33 35 37 38 40 42 44 46 47 49 51 53 55 57 59 60 62
		$N_{_1}$	= 7			$N_{_1}$	= 8	
N ₂	0.5	1.0	2.5	5.0%	0.5	1.0	2.5	5.0%
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	32 34 35 37 38 40 41 43 44 46 47 49 50 52 53 55 57 58 60	34 35 37 39 40 42 44 45 47 49 51 52 54 56 58 59 61 63 64	36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72	39 41 43 45 47 49 52 54 56 58 61 63 65 67 69 72 74 76 78	43 45 47 49 51 53 54 56 62 64 66 68 70 71 73 75	45 47 49 51 53 56 58 60 62 64 66 68 70 72 74 76 78 81	49 51 53 55 58 60 62 65 67 70 72 74 77 79 81 84 86 89	51 54 56 59 62 64 67 69 72 75 77 80 83 85 88 90 93 96

.....continued in Howell to $N_1 = 25$

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Wilcoxin T Distribution Table

Critical Value Table for the Wilcoxin Matched Pairs Ordinal Test Chapter 24

number		.05		.025		.01		.005
of pairs N	т	α	т	α	т	α	т	α
5	0	.0313 .0625						
6	2 3	.0469 .0781	0	.0156 .0313				
7	3 4	.0391 .0547	2 3	.0234 .0391	0	.0078 .0156		
8	5 6	.0391 .0547	3 4	.0195 .0273	1 2	.0078 .0117	0 1	.0039 .0078
9	8	.0488	5	.0195	3	.0098	1	.0039
	9	.0645	6	.0273	4	.0137	2	.0059
10	10	.0420	8	.0244	5	.0098	3	.0049
	11	.0527	9	.0322	6	.0137	4	.0068
11	13	.0415	10	.0210	7	.0093	5	.0049
	14	.0508	11	.0269	8	.0122	6	.0068
12	17	.0461	13	.0212	9	.0081	7	.0046
	18	.0549	14	.0261	10	.0105	8	.0061
13	21	.0471	17	.0239	12	.0085	9	.0040
	22	.0549	18	.0287	13	.0107	10	.0052
14	25	.0453	21	.0247	15	.0083	12	.0043
	26	.0520	22	.0290	16	.0101	13	.0054
15	30	.0473	25	.0240	19	.0090	15	.0042
	31	.0535	26	.0277	20	.0108	16	.0051
16	35	.0467	29	.0222	23	.0091	19	.0046
	36	.0523	30	.0253	24	.0107	20	.0055
17	41	.0492	34	.0224	27	.0087	23	.0047
	42	.0544	35	.0253	28	.0101	24	.0055
18	47	.0494	40	.0241	32	.0091	27	.0045
	48	.0542	41	.0269	33	.0104	28	.0052
19	53	.0478	46	.0247	37	.0090	32	.0047
	54	.0521	47	.0273	38	.0102	33	.0054
20	60	.0487	52	.0242	43	.0096	37	.0047
	61	.0527	53	.0266	44	.0107	38	.0053

.....continued in Howell to N = 50

q-Distribution Table

Critical Value Table for the Studentized-Range Statistic - Used with Chapter 24

	r = Number of Steps Between Ordered Means													
$\mathrm{df_w}$	2	3	4	5	6	7	8	9	10					
1 2 3 4	17.97 6.08 4.50 3.93	26.98 8.33 5.91 5.04	32.82 9.80 6.82 5.76	37.08 10.88 7.50 6.29	40.41 11.74 8.04 6.71	43.12 12.44 8.48 7.05	45.40 13.03 8.85 7.35	47.36 13.54 9.18 7.60	49.07 13.99 9.46 7.33					
5 6 7 8 9	3.64 3.46 3.34 3.26 3.20	4.60 4.34 4.16 4.04 3.95	5.22 4.90 4.68 4.53 4.42	5.67 5.31 5.06 4.89 4.76	6.03 5.63 5.36 5.17 5.02	6.33 5.90 5.61 5.40 5.24	6.58 6.12 5.82 5.60 5.43	6.80 6.32 6.00 5.77 5.60	7.00 6.49 6.16 5.92 5.74					
10 11 12 13 14	3.15 3.11 3.08 3.06 3.03	3.88 3.82 3.77 3.74 3.70	4.33 4.26 4.20 4.15 4.11	4.65 4.57 4.51 4.45 4.41	4.91 4.82 4.75 4.69 4.64	5.12 5.03 4.95 4.88 4.83	5.30 5.20 5.12 5.05 4.99	5.46 5.35 5.26 5.19 5.13	5.60 5.49 5.40 5.32 5.25					
15 16 17 18 19	3.01 3.00 2.98 2.97 2.96	3.67 3.65 3.63 3.61 3.59	4.08 4.05 4.02 4.00 3.98	4.37 4.33 4.30 4.28 4.25	4.60 4.56 4.52 4.50 4.47	4.78 4.74 4.70 4.67 4.64	4.94 4.90 4.86 4.82 4.79	5.08 5.03 4.99 4.96 4.92	5.20 5.15 5.11 5.07 5.04					
20 24	2.95 2.92	3.58 3.53	3.96 3.90	4.23 4.17	4.44 4.37	4.62 4.54	4.77 4.68	4.90 4.81	5.01 4.92					
30	2.89	3.49	3.84	4.10	4.30	4.46	4.60	4.72	4.82					
40	2.86	3.44	3.79	4.04	4.23	4.39	4.52	4.64	4.74					
60	2.83	3.40	3.74	3.98	4.16	4.31	4.44	4.55	4.65					
120	2.80	3.36	3.69	3.92	4.10	4.24	4.36	4.47	4.56					
∞	2.77	3.31	3.63	3.86	4.03	4.17	4.29	4.39	4.47					

.....continued in Howell to r = 15

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U-Distribution Table

Critical Value Table for the Mann-Whitney U test Chapter 24

1-tail test at $\alpha = 0.025$ or **2-tail test at \alpha = 0.05**

											$N_{_{1}}$										
N_2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1 2					0	1	1	0	0	0	0	1	1	1	1	1	2	2	2	2	
3 4 5			0	0 1	0 1 2	1 2 3	1 3 5	2 4 6	2 4 7	3 5 8	3 6 9	4 7 11	4 8 12	5 9 13	5 10 14	6 11 15	6 11 17	7 12 18	7 13 19	8 13 20	
6 7		0	1	3	5	5	6 8	8 10	10 12	11	13	14 18	16 20	17 22	19 24	21 26	22 28	24 30	25 32	27 34	
8 9 10		0 0 0	2 2 3	4 4 5	6 7 8	8 10 11	10 12 14	13 15 17	15 17 20	17 20 23	19 23 26	22 26 29	24 28 33	26 31 36	29 34 39	21 37 42	34 39 45	36 42 48	38 45 52	41 48 55	
11 12		0 1 1	3 4	6 7	9 11	13 14	16 18	19 22 24	23 26	26 29	30 33	33 37	37 41	40 45	44 49	47 53	51 57	55 61	58 65	62 69	
13 14 15		1 1 1	4 5 5	8 9 10	12 13 14	16 17 19	20 22 24	26 29	28 31 34	33 36 39	37 40 44	41 45 49	45 50 54	50 55 59	54 59 64	59 64 70	63 67 75	67 74 80	72 78 85	76 83 90	
16 17 18		1 2 2	6 6 7	11 11 12	15 17 18	21 22 24	26 28 30	31 34 36	37 39 42	42 45 48	47 51 55	53 57 61	59 63 67	64 67 74	70 75 80	75 81 86	81 87 93	86 93 99	92 99 106	98 105 112	
19 20		2 2	7 8	13 13	19 20	25 27	32 34	38 41	42 45 48	52 55	58 62	65 69	72 76	78 83	95 90	92 98	99 105	106 112	113 119	112 119 127	

1-tail test at \alpha = 0.05 or 2-tail test at $\alpha = 0.10$

											$N_{_{I}}$										
N_2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1																					
2					0	0	0	1	1	1	1	2	2	2	3	3	3	4	4	4	
3			0	0	1	2	2	3	3	4	5	5	6	7	7	8	9	9	10	11	
4			0	1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	17	18	
5		0	1	2	4	5	6	8	9	11	12	13	15	16	18	19	20	22	23	25	
6		0	2	3	5	7	8	10	12	14	16	17	19	21	23	25	26	28	30	32	
7		0	2	4	6	8	11	13	15	17	19	21	24	26	28	30	33	35	37	39	
8		1	3	5	8	10	13	15	18	20	23	26	28	31	33	36	39	41	44	47	
9		1	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	
10		1	4	7	11	14	17	20	24	27	31	34	37	41	44	48	51	55	58	62	
11		1	5	8	12	16	19	23	27	31	34	38	42	46	50	54	57	61	65	69	
12		2	5	9 10	13 15	17	21	26	30	34	38	42	47 51	51	55	60	64	68 75	72	77	
13 14		2 2	6 7	11	16	19 21	24 26	28 31	33 36	37 41	42 46	47 51	56	56 61	61 66	65 71	70 77	75 82	80 87	84 92	
15		3	7	12	18	23	28	33	39	44	50	55	61	66	72	77	83	88	94	100	
16		3	8	14	19	25	30	36	42	48	54	60	65	71	77	83	89	95	101	107	
17		3	9	15	20	26	33	39	45	51	57	64	70	77	83	89	96	102	109	115	
18		4	9	16	22	28	35	41	48	55	61	68	75	82	88	95	102	102	116	123	
19	0	4	10	17	23	30	37	44	51	58	65	72	80	87	94	101	102	116	123	130	
20	0	4	11	18	25	32	39	47	54	62	69	77	84	92	100	107	115	123	130	138	

 $N_1 < N_2$