



Table 5.A. Normal curve table

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

Table 9.A. *t*-distribution values

df	Probability					two-tailed one-tailed
	0.50	0.10	0.05	0.02	0.01	
	0.25	0.05	0.025	0.01	0.005	
1	1.00	6.34	12.71	31.82	63.66	
2	.816	2.92	4.30	6.96	9.92	
3	.765	2.35	3.18	4.54	5.84	
4	.741	2.13	2.78	3.75	4.60	
5	.727	2.02	2.57	3.36	4.03	
6	.718	1.94	2.45	3.14	3.71	
7	.711	1.90	2.36	3.00	3.50	
8	.706	1.86	2.31	2.90	3.36	
9	.703	1.83	2.26	2.82	3.25	
10	.700	1.81	2.23	2.76	3.17	
11	.697	1.80	2.20	2.72	3.11	
12	.695	1.78	2.18	2.68	3.06	
13	.694	1.77	2.16	2.65	3.01	
14	.692	1.76	2.14	2.62	2.98	
15	.691	1.75	2.13	2.60	2.95	
16	.690	1.75	2.12	2.58	2.92	
17	.689	1.74	2.11	2.57	2.90	
18	.688	1.73	2.10	2.55	2.88	
19	.688	1.73	2.09	2.54	2.86	
20	.687	1.72	2.09	2.53	2.84	
21	.686	1.72	2.08	2.52	2.83	
22	.686	1.72	2.07	2.51	2.82	
23	.685	1.71	2.07	2.50	2.81	
24	.685	1.71	2.06	2.49	2.80	
25	.684	1.71	2.06	2.48	2.79	
30	.683	1.70	2.04	2.46	2.75	
35	.682	1.69	2.03	2.46	2.72	
40	.681	1.68	2.02	2.42	2.71	
60	.678	1.67	2.00	2.39	2.69	
120	.676	1.66	1.98	2.36	2.62	
∞	.674	1.645	1.96	2.33	2.575	

Table 10.A F-distribution values

		df for									
		s_C^2		s_R^2		s_B^2					
		1	2	3	4	5	6	7	8	9	10
df for s_W^2	1	161	200	216	225	230	234	237	239	241	242
		4052	4999	5403	5625	5764	5859	5928	5981	6022	6056
	2	18.51	19	19.16	19.25	19.3	19.33	19.36	19.37	19.38	19.39
		98.49	99	99.17	99.25	99.3	99.33	99.36	99.37	99.39	99.4
	3	10.13	9.55	9.28	9.12	9.01	8.94	8.88	8.84	8.81	8.78
		34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.34	27.23
	4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6	5.96
		21.2	18	16.69	15.98	15.52	15.21	14.91	14.8	14.66	14.54
	5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.78	4.74
		16.26	13.27	12.06	11.39	10.97	10.67	10.45	10.29	10.15	10.05
	6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.1	4.06
		33.74	10.92	9.78	9.15	8.75	8.47	8.26	8.1	7.98	7.87
	7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.63
		12.25	9.55	8.45	7.85	7.46	7.19	7	6.84	6.71	6.62
	8	5.32	4.46	4.07	3.84	3.69	3.58	3.5	3.44	3.39	3.34
		11.26	8.65	7.59	7.01	6.63	6.37	6.19	6.03	5.91	5.82
	9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.13
		10.56	8.02	6.99	6.42	6.06	5.8	5.62	5.47	5.35	5.26
	10	4.96	4.1	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.97
		10.04	7.56	6.55	5.99	5.64	5.39	5.21	5.06	4.95	4.85
11	4.84	3.98	3.59	3.36	3.2	3.09	3.01	2.95	2.9	2.86	
	9.65	7.2	6.22	5.67	5.32	5.07	4.88	4.74	4.63	4.54	
12	4.75	3.88	3.49	3.26	3.11	3	2.92	2.85	2.8	2.76	
	9.33	6.93	5.95	5.41	5.06	4.82	4.65	4.5	4.39	4.3	
13	4.67	3.8	3.41	3.18	3.02	2.92	2.84	2.77	2.72	2.67	
	9.07	6.7	5.74	5.2	4.86	4.62	4.44	4.3	4.19	4.1	
14	4.6	3.74	3.34	3.11	2.96	2.85	2.77	2.7	2.65	2.6	
	8.86	6.51	5.56	5.03	4.69	4.46	4.28	4.14	4.03	3.94	
15	4.54	3.68	3.29	3.06	2.9	2.79	2.7	2.64	2.59	2.55	
	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4	3.89	3.8	
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	
	8.53	6.23	5.29	4.77	4.44	4.2	4.03	3.89	3.78	3.69	
17	4.45	3.59	3.2	2.96	2.81	2.7	2.62	2.55	2.5	2.45	
	8.4	6.11	5.18	4.67	4.34	4.1	3.93	3.79	3.68	3.59	
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	
	8.28	6.01	5.09	4.58	4.25	4.01	3.85	3.71	3.6	3.51	
19	4.38	3.52	3.13	2.9	2.74	2.63	2.55	2.48	2.43	2.38	
	8.18	5.93	5.01	4.5	4.17	3.94	3.77	3.63	3.52	3.43	
20	4.35	3.49	3.1	2.87	2.72	2.6	2.52	2.45	2.4	2.35	
	8.1	5.85	4.94	4.43	4.1	3.87	3.71	3.56	3.45	3.37	
22	4.3	3.44	3.05	2.82	2.66	2.55	2.47	2.4	2.35	2.3	
	7.94	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	
23	4.28	3.42	3.03	2.8	2.64	2.53	2.45	2.38	2.32	2.28	
	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.3	3.21	
25	4.24	3.38	2.99	2.76	2.6	2.49	2.41	2.34	2.28	2.24	
	7.77	5.57	4.61	4.18	3.86	3.63	3.46	3.32	3.21	3.13	
26	4.22	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	
	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.27	3.09	
28	4.2	3.34	2.95	2.72	2.56	2.44	2.36	2.29	2.24	2.29	
	7.64	5.45	4.57	4.07	3.76	3.53	3.36	3.23	3.12	3.03	
29	4.18	3.33	2.93	2.7	2.54	2.43	2.35	2.28	2.22	2.18	
	7.6	5.42	4.54	4.04	3.73	3.5	3.33	3.2	3.08	3	
30	4.27	3.32	2.92	2.69	2.53	2.42	2.34	2.27	2.21	2.16	
	7.56	5.39	4.51	4.02	3.7	3.47	3.3	3.17	3.06	2.98	
34	4.13	3.28	2.88	2.65	2.49	2.38	2.3	2.23	2.27	2.12	
	7.44	5.29	4.42	3.93	3.61	3.38	3.21	3.08	2.97	2.89	
38	4.2	3.25	2.85	2.62	2.46	2.35	2.26	2.29	2.14	2.09	
	7.35	5.21	4.34	3.86	3.54	3.32	3.15	3.02	2.91	2.82	
40	4.08	3.23	2.84	2.62	2.45	2.34	2.25	2.28	2.22	2.07	
	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.88	2.8	
46	4.05	3.2	2.81	2.57	2.42	2.3	2.22	2.14	2.09	2.04	
	7.21	5.1	4.24	3.76	3.44	3.22	3.05	2.92	2.82	2.73	
50	4.03	3.18	2.79	2.56	2.4	2.29	2.2	2.13	2.07	2.02	
	7.17	5.06	4.2	3.72	3.41	3.11	3.02	2.83	2.78	2.7	
60	4	3.15	2.76	2.52	2.37	2.25	2.17	2.1	2.04	1.99	
	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	
70	3.98	3.13	2.74	2.5	2.35	2.23	2.14	2.07	2.01	1.97	
	7.01	4.92	4.08	3.6	3.29	3.07	2.91	2.77	2.67	2.59	

Table 10.B Studentized Range for Tukey test.

df	α	$k = \# \text{ of means}$									
		2	3	4	5	6	7	8	9	10	11
5	.05	3.64	4.60	5.22	5.6V-	6.03	6.33	6.58	6.80	6.99	7.17
	.01	5.70	6.98	7.80	8.42	8.91	9.32	9.67	9.97	10.24	10.48
6	.05	3.46	4.34	4.90	5.30	5.63	5.90	6.12	6.32	6.49	6.65
	.01	5.24	6.33	7.03	7.56	7.97	8.32	8.61	8.87	9.10	9.30
7	.05	3.34	4.16	4.68	5.06	5.36	5.61	5.82	6.00	6.16	6.30
	.01	4.95	5.92	6.54	7.01	7.37	7.68	7.94	8.17	8.37	8.55
8	.05	3.26	4.04	4.53	4.89	5.17	5.40	5.60	5.77	5.92	6.05
	.01	4.75	5.64	6.20	6.62	6.96	7.24	7.47	7.68	7.86	8.03
9	.05	3.20	3.95	4.41	4.76	5.02	5.24	5.43	5.59	5.74	5.87
	.01	4.60	5.43	5.96	6.35	6.66	6.91	7.13	7.33	7.49	7.65
10	.05	3.15	3.88	4.33	4.65	4.91	5.12	5.30	5.46	5.60	5.72
	.01	4.48	5.27	6.77	6.14	6.43	6.67	6.87	7.05	7.21	7.36
11	.05	3.11	3.82	4.26	4.57	4.82	5.03	5.20	5.35	5.49	5.61
	.01	4.39	5.15	5.62	5.97	6.25	6.48	6.67	6.84	6.99	7.13
12	.05	3.08	3.77	4.20	4.51	4.75	4.95	5.12	5.27	5.39	5.51
	.01	4.32	5.05	5.50	5.84	6.10	6.32	6.51	6.67	6.81	6.94
13	.05	3.06	3.73	4.15	4.45	4.69	4.88	5.05	5.19	5.32	5.43
	.01	4.26	4.96	5.40	5.73	5.98	6.19	6.37	6.53	6.67	6.79
14	.05	3.03	3.70	4.11	4.41	4.64	4.83	4.99	5.13	5.25	5.36
	.01	4.21	4.89	5.32	5.63	5.88	6.08	6.26	6.41	6.54	6.66
15	.05	3.01	3.67	4.08	4.37	4.59	4.78	4.94	5.08	5.20	5.31
	.01	4.17	4.84	5.25	5.56	5.80	5.99	6.16	6.31	6.44	6.55
16	.05	3.00	3.65	4.05	4.33	4.56	4.74	4.90	5.03	5.15	5.26
	.01	4.13	4.79	5.19	5.49	5.72	5.92	6.08	6.22	6.35	6.46
17	.05	2.98	3.63	4.02	4.30	4.52	4.70	4.86	4.99	5.11	5.21
	.01	4.10	4.74	5.14	5.43	5.66	5.85	6.01	6.15	6.27	6.38
18	.05	2.97	3.61	4.00	4.28	4.49	4.67	4.82	4.96	5.07	5.17
	.01	4.07	4.70	5.09	5.38	5.60	5.79	5.94	6.08	6.20	6.31
19	.05	2.96	3.59	3.98	4.25	4.47	4.65	4.79	4.92	5.04	5.14
	.01	4.05	4.67	5.05	5.33	5.55	5.73	5.89	6.02	6.14	6.25
20	.05	2.95	3.58	3.96	4.23	4.45	4.62	4.77	4.90	5.01	5.11
	.01	4.02	4.64	5.02	5.29	5.51	5.69	5.84	5.97	6.09	6.19
24	.05	2.92	3.53	3.90	4.17	4.37	4.54	4.68	4.81	4.92	5.01
	.01	3.96	4.55	4.91	5.17	5.37	5.54	5.69	5.81	5.92	6.02
30	.05	2.89	3.49	3.85	4.10	4.30	4.46	4.60	4.72	4.82	4.92
	.01	3.89	4.45	4.80	5.05	5.24	5.40	5.54	5.65	5.76	5.85
40	.05	2.86	3.44	3.79	4.04	4.23	4.39	4.52	4.63	4.73	4.82
	.01	3.82	4.37	4.70	4.93	5.11	5.26	5.39	5.50	5.60	5.69
60	.05	2.83	3.40	3.74	3.98	4.16	4.31	4.44	4.55	4.65	4.73
	.01	3.76	4.28	4.59	4.82	4.99	5.13	5.25	5.36	5.45	5.53
120	.05	2.80	3.36	3.68	3.92	4.10	4.24	4.36	4.47	4.56	4.64
	.01	3.70	4.20	4.50	4.71	4.87	5.01	5.12	5.21	5.30	5.37
∞	.05	2.77	3.31	3.63	3.86	4.03	4.17	4.29	4.39	4.47	4.55
	.01	3.64	4.12	4.40	4.60	4.76	4.88	4.99	5.08	5.16	5.23

df for s_w^2

Table 11.A Chi-square distribution upper tail

df/α	0.100	0.050	0.025	0.010	0.005	0.001
1	2.71	3.84	5.02	6.63	7.88	10.8
2	4.61	5.99	7.38	9.21	10.6	13.8
3	6.25	7.81	9.35	11.3	12.8	16.3
4	7.78	9.49	11.1	13.3	14.9	18.5
5	9.24	11.1	12.8	15.1	16.7	20.5
6	10.6	12.6	14.4	16.8	18.5	22.5
7	12.0	14.1	16.0	18.5	20.3	24.3
8	13.4	15.5	17.5	20.1	22.0	26.1
9	14.7	16.9	19.0	21.7	23.6	27.9
10	16.0	18.3	20.5	23.2	25.2	29.6
11	17.3	19.7	21.9	24.7	26.8	31.3
12	18.5	21.0	23.3	26.2	28.3	32.9
13	19.8	22.4	24.7	27.7	29.8	34.5
14	21.1	23.7	26.1	29.1	31.3	36.1
15	22.3	25.0	27.5	30.6	32.8	37.7
16	23.5	26.3	28.8	32.0	34.3	39.3
17	24.8	27.6	30.2	33.4	35.7	40.8
18	26.0	28.9	31.5	34.8	37.2	42.3
19	27.2	30.1	32.9	36.2	38.6	43.8
20	28.4	31.4	34.2	37.6	40.0	45.3
21	29.6	32.7	35.5	38.9	41.4	46.8
22	30.8	33.9	36.8	40.3	42.8	48.3
23	32.0	35.2	38.1	41.6	44.2	49.7
24	33.2	36.4	39.4	43.0	45.6	51.2
25	34.4	37.7	40.6	44.3	46.9	52.6
30	40.3	43.8	47.0	50.9	53.7	59.7
35	46.1	49.8	53.2	57.3	60.3	66.6
40	51.8	55.8	59.3	63.7	66.8	73.4
60	74.4	74.4	83.3	88.4	92.0	99.6
80	96.6	101.9	106.6	112.3	116.3	124.8
100	118.5	124.3	129.6	135.8	140.2	149.4