APPENDICES: STATISTICAL TABLES

TABLE A. Areas under the Standard Normal Distribution

z	area between mean and z	z	area between mean and z	z	area between mean and z	z	area between mean and z	z	area between mean and z	z	area between mean and z	z	area between mean and z
0.00	.0000	0.40	.1554	0.80	.2881	1.20	.3849	1.60	.4452	2.00	.4772	2.40	.4918
0.01	.0040	0.41	.1591	0.81	.2910	1.21	.3869	1.61	.4463	2.01	.4778	2.41	.4920
0.02	.0080	0.42	.1628	0.82	.2939	1.22	.3888	1.62	.4474	2.02	.4783	2.42	.4922
0.03	.0120	0.43	.1664	0.83	.2967	1.23	.3907	1.63	.4484	2.03	.4788	2.43	.4925
0.04	.0160	0.44	.1700	0.84	.2995	1.24	.3925	1.64	.4495	2.04	.4793	2.44	.4927
0.05	.0199	0.45	.1736	0.85	.3023	1.25	.3944	1.65	.4505	2.05	.4798	2.45	.4929
0.06	.0239	0.46	.1772	0.86	.3051	1.26	.3962	1.66	.4515	2.06	.4803	2.46	.4931
0.07	.0279	0.47	.1808	0.87	.3078	1.27	.3980	1.67	.4525	2.07	.4808	2.47	.4932
0.08	.0319	0.48	.1844	0.88	.3106	1.28	.3997	1.68	.4535	2.08	.4812	2.48	.4934
0.09	.0359	0.49	.1879	0.89	.3133	1.29	.4015	1.69	.4545	2.09	.4817	2.49	.4936
0.10	.0398	0.50	.1915	0.90	.3159	1.30	.4032	1.70	.4554	2.10	.4821	2.50	.4938
0.11	.0438	0.51	.1950	0.91	.3186	1.31	.4049	1.71	.4564	2.11	.4826	2.55	.4946
0.12	.0478	0.52	.1985	0.92	.3212	1.32	.4066	1.72	.4573	2.12	.4830	2.60	.4953
0.13	.0517	0.53	.2019	0.93	.3238	1.33	.4082	1.73	.4582	2.13	.4834	2.65	.4960
0.14	.0557	0.54	.2054	0.94	.3264	1.34	.4099	1.74	.4591	2.14	.4838	2.70	.4965
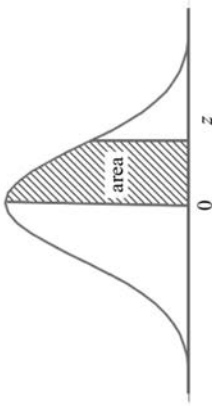
0.15	.0596	0.55	.2088	0.95	.3289	1.35	.4115	1.75	.4599	2.15	.4842	2.75	.4970
0.16	.0636	0.56	.2123	0.96	.3315	1.36	.4131	1.76	.4608	2.16	.4846	2.80	.4974
0.17	.0675	0.57	.2157	0.97	.3340	1.37	.4147	1.77	.4616	2.17	.4850	2.85	.4978
0.18	.0714	0.58	.2190	0.98	.3365	1.38	.4162	1.78	.4625	2.18	.4854	2.90	.4981
0.19	.0753	0.59	.2224	0.99	.3389	1.39	.4177	1.79	.4633	2.19	.4857	2.95	.4984
0.20	.0793	0.60	.2257	1.00	.3413	1.40	.4192	1.80	.4641	2.20	.4861	3.00	.49865
0.21	.0832	0.61	.2291	1.01	.3438	1.41	.4207	1.81	.4649	2.21	.4864	3.05	.49886
0.22	.0871	0.62	.2324	1.02	.3461	1.42	.4222	1.82	.4656	2.22	.4868	3.10	.49903
0.23	.0910	0.63	.2357	1.03	.3485	1.43	.4236	1.83	.4664	2.23	.4871	3.15	.49918
0.24	.0948	0.64	.2389	1.04	.3508	1.44	.4251	1.84	.4671	2.24	.4875	3.20	.49931
0.25	.0987	0.65	.2422	1.05	.3531	1.45	.4265	1.85	.4678	2.25	.4878	3.25	.49942
0.26	.1026	0.66	.2454	1.06	.3554	1.46	.4279	1.86	.4686	2.26	.4881	3.30	.49952
0.27	.1064	0.67	.2486	1.07	.3577	1.47	.4292	1.87	.4693	2.27	.4884	3.35	.49960
0.28	.1103	0.68	.2517	1.08	.3599	1.48	.4306	1.88	.4699	2.28	.4887	3.40	.49966
0.29	.1141	0.69	.2549	1.09	.3621	1.49	.4319	1.89	.4706	2.29	.4890	3.45	.49972
0.30	.1179	0.70	.2580	1.10	.3643	1.50	.4332	1.90	.4713	2.30	.4893	3.50	.49977
0.31	.1217	0.71	.2611	1.11	.3665	1.51	.4345	1.91	.4719	2.31	.4896	3.55	.49981
0.32	.1255	0.72	.2642	1.12	.3686	1.52	.4357	1.92	.4726	2.32	.4898	3.60	.49984
0.33	.1293	0.73	.2673	1.13	.3708	1.53	.4370	1.93	.4732	2.33	.4901	3.65	.49987
0.34	.1331	0.74	.2704	1.14	.3729	1.54	.4382	1.94	.4738	2.34	.4904	3.70	.49989
0.35	.1368	0.75	.2734	1.15	.3749	1.55	.4394	1.95	.4744	2.35	.4906	3.75	.49991
0.36	.1406	0.76	.2764	1.16	.3770	1.56	.4406	1.96	.4750	2.36	.4909	3.80	.49993
0.37	.1443	0.77	.2794	1.17	.3790	1.57	.4418	1.97	.4756	2.37	.4911	3.85	.49994
0.38	.1480	0.78	.2823	1.18	.3810	1.58	.4429	1.98	.4761	2.38	.4913	3.90	.49995
0.39	.1517	0.79	.2852	1.19	.3830	1.59	.4441	1.99	.4767	2.39	.4916		

Source: The entries in this table were computed by the authors.

TABLE B. Critical Values of Student's *t* Distribution

	Level of significance for a one-tailed test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for a two-tailed test					
df	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.599
3	1.638	2.353	3.182	4.541	5.841	12.924
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.869
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.408
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.768
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
100	1.290	1.660	1.984	2.364	2.626	3.390
160	1.287	1.654	1.975	2.350	2.607	3.352
∞	1.282	1.645	1.960	2.326	2.576	3.291

Source: The entries in this table were computed by the authors.

TABLE C. Critical Values of the F Distribution

Degrees of freedom for denominator	α	Degrees of freedom for numerator															
		1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	50
1	.05	161	199	216	225	230	234	237	239	241	242	246	248	249	250	251	252
	.01	4052	4999	5403	5625	5764	5859	5928	5981	6022	6056	6157	6209	6240	6261	6287	6303
2	.05	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.43	19.45	19.46	19.46	19.47	19.48
	.01	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39	99.40	99.43	99.45	99.46	99.47	99.47	99.48
3	.05	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.70	8.66	8.63	8.62	8.59	8.58
	.01	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35	27.23	26.87	26.69	26.58	26.50	26.41	26.35
4	.05	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.86	5.80	5.77	5.75	5.72	5.70
	.01	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55	14.20	14.02	13.91	13.84	13.75	13.69
5	.05	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.62	4.56	4.52	4.50	4.46	4.44
	.01	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	9.72	9.55	9.45	9.38	9.29	9.24
6	.05	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	3.94	3.87	3.83	3.81	3.77	3.75
	.01	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.56	7.40	7.30	7.23	7.14	7.09
7	.05	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.51	3.44	3.40	3.38	3.34	3.32
	.01	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.31	6.16	6.06	5.99	5.91	5.86
8	.05	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.22	3.15	3.11	3.08	3.04	3.02
	.01	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.52	5.36	5.26	5.20	5.12	5.07
9	.05	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.01	2.94	2.89	2.86	2.83	2.80
	.01	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	4.96	4.81	4.71	4.65	4.57	4.52
10	.05	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.85	2.77	2.73	2.70	2.66	2.64
	.01	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.56	4.41	4.31	4.25	4.17	4.12
11	.05	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.72	2.65	2.60	2.57	2.53	2.51
	.01	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.25	4.10	4.01	3.94	3.86	3.81
12	.05	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.62	2.54	2.50	2.47	2.43	2.40
	.01	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.01	3.86	3.76	3.70	3.62	3.57

(Continued)

TABLE C. (*Continued*)

Degrees of freedom for denominator	α	Degrees of freedom for numerator															
		1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	50
13	.05	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.53	2.46	2.41	2.38	2.34	2.31
	.01	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	3.82	3.66	3.57	3.51	3.43	3.38
14	.05	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.46	2.39	2.34	2.31	2.27	2.24
	.01	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.66	3.51	3.41	3.35	3.27	3.22
15	.05	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.40	2.33	2.28	2.25	2.20	2.18
	.01	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.52	3.37	3.28	3.21	3.13	3.08
16	.05	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.35	2.28	2.23	2.19	2.15	2.12
	.01	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.41	3.26	3.16	3.10	3.02	2.97
17	.05	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.31	2.23	2.18	2.15	2.10	2.08
	.01	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.31	3.16	3.07	3.00	2.92	2.87
18	.05	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.27	2.19	2.14	2.11	2.06	2.04
	.01	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.23	3.08	2.98	2.92	2.84	2.78
19	.05	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.23	2.16	2.11	2.07	2.03	2.00
	.01	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.15	3.00	2.91	2.84	2.76	2.71
20	.05	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.20	2.12	2.07	2.04	1.99	1.97
	.01	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.09	2.94	2.84	2.78	2.69	2.64
21	.05	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.18	2.10	2.05	2.01	1.96	1.94
	.01	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40	3.31	3.03	2.88	2.79	2.72	2.64	2.58
22	.05	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.15	2.07	2.02	1.98	1.94	1.91
	.01	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	2.98	2.83	2.73	2.67	2.58	2.53
23	.05	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.13	2.05	2.00	1.96	1.91	1.88
	.01	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30	3.21	2.93	2.78	2.69	2.62	2.54	2.48
24	.05	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.11	2.03	1.97	1.94	1.89	1.86
	.01	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	2.89	2.74	2.64	2.58	2.49	2.44
25	.05	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.09	2.01	1.96	1.92	1.87	1.84
	.01	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13	2.85	2.70	2.60	2.54	2.45	2.40

df																	
26	.05	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.07	1.99	1.94	1.90	1.85	1.82
	.01	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18	3.09	2.81	2.66	2.57	2.50	2.42	2.36
27	.05	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.06	1.97	1.92	1.88	1.84	1.81
	.01	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26	3.15	3.06	2.78	2.63	2.54	2.47	2.38	2.33
28	.05	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.04	1.96	1.91	1.87	1.82	1.79
	.01	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12	3.03	2.75	2.60	2.51	2.44	2.35	2.30
29	.05	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.03	1.94	1.89	1.85	1.81	1.77
	.01	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20	3.09	3.00	2.73	2.57	2.48	2.41	2.33	2.27
30	.05	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.01	1.93	1.88	1.84	1.79	1.76
	.01	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.70	2.55	2.45	2.39	2.30	2.25
35	.05	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	1.96	1.88	1.82	1.79	1.74	1.70
	.01	7.42	5.27	4.40	3.91	3.59	3.37	3.20	3.07	2.96	2.88	2.60	2.44	2.35	2.28	2.19	2.14
40	.05	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	1.92	1.84	1.78	1.74	1.69	1.66
	.01	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.52	2.37	2.27	2.20	2.11	2.06
45	.05	4.06	3.20	2.81	2.58	2.42	2.31	2.22	2.15	2.10	2.05	1.89	1.81	1.75	1.71	1.66	1.63
	.01	7.23	5.11	4.25	3.77	3.45	3.23	3.07	2.94	2.83	2.74	2.46	2.31	2.21	2.14	2.05	2.00
50	.05	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.87	1.78	1.73	1.69	1.63	1.60
	.01	7.17	5.06	4.20	3.72	3.41	3.19	3.02	2.89	2.78	2.70	2.42	2.27	2.17	2.10	2.01	1.95
55	.05	4.02	3.16	2.77	2.54	2.38	2.27	2.18	2.11	2.06	2.01	1.85	1.76	1.71	1.67	1.61	1.58
	.01	7.12	5.01	4.16	3.68	3.37	3.15	2.98	2.85	2.75	2.66	2.38	2.23	2.13	2.06	1.97	1.91
60	.05	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.84	1.75	1.69	1.65	1.59	1.56
	.01	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.35	2.20	2.10	2.03	1.94	1.88
100	.05	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.77	1.68	1.62	1.57	1.52	1.48
	.01	6.90	4.82	3.98	3.51	3.21	2.99	2.82	2.69	2.59	2.50	2.22	2.07	1.97	1.89	1.80	1.74
160	.05	3.90	3.05	2.66	2.43	2.27	2.16	2.07	2.00	1.94	1.89	1.73	1.64	1.57	1.53	1.47	1.43
	.01	6.80	4.74	3.91	3.44	3.13	2.92	2.75	2.62	2.52	2.43	2.15	1.99	1.89	1.82	1.72	1.66
300	.05	3.87	3.03	2.63	2.40	2.24	2.13	2.04	1.97	1.91	1.86	1.70	1.61	1.54	1.50	1.43	1.39
	.01	6.72	4.68	3.85	3.38	3.08	2.86	2.70	2.57	2.47	2.38	2.10	1.94	1.84	1.76	1.66	1.59
∞	.05	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.67	1.57	1.51	1.46	1.39	1.35
	.01	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.04	1.88	1.77	1.70	1.59	1.52

Source: The entries in this table were computed by the authors.

TABLE D. Critical Values of the Chi Square Distribution

Degrees of freedom, df	Alpha levels					
	.10	.05	.02	.01	.002	.001
1	2.706	3.841	5.412	6.635	9.550	10.828
2	4.605	5.991	7.824	9.210	12.429	13.816
3	6.251	7.815	9.837	11.345	14.796	16.266
4	7.779	9.488	11.668	13.277	16.924	18.467
5	9.236	11.070	13.388	15.086	18.907	20.515
6	10.645	12.592	15.033	16.812	20.791	22.458
7	12.017	14.067	16.622	18.475	22.601	24.322
8	13.362	15.507	18.168	20.090	24.352	26.124
9	14.684	16.919	19.679	21.666	26.056	27.877
10	15.987	18.307	21.161	23.209	27.722	29.588
11	17.275	19.675	22.618	24.725	29.354	31.264
12	18.549	21.026	24.054	26.217	30.957	32.909
13	19.812	22.362	25.472	27.688	32.535	34.528
14	21.064	23.685	26.873	29.141	34.091	36.123
15	22.307	24.996	28.259	30.578	35.628	37.697
16	23.542	26.296	29.633	32.000	37.146	39.252
17	24.769	27.587	30.995	33.409	38.648	40.790
18	25.989	28.869	32.346	34.805	40.136	42.312
19	27.204	30.144	33.687	36.191	41.610	43.820
20	28.412	31.410	35.020	37.566	43.072	45.315
21	29.615	32.671	36.343	38.932	44.522	46.797
22	30.813	33.924	37.659	40.289	45.962	48.268
23	32.007	35.172	38.968	41.638	47.391	49.728
24	33.196	36.415	40.270	42.980	48.812	51.179
25	34.382	37.652	41.566	44.314	50.223	52.620
26	35.563	38.885	42.856	45.642	51.627	54.052
27	36.741	40.113	44.140	46.963	53.023	55.476
28	37.916	41.337	45.419	48.278	54.411	56.892
29	39.087	42.557	46.693	49.588	55.792	58.301
30	40.256	43.773	47.962	50.892	57.167	59.703
40	51.805	55.758	60.436	63.691	70.618	73.402
60	74.397	79.082	84.580	88.379	96.404	99.607
100	118.498	124.342	131.142	135.807	145.577	149.449
160	183.311	190.516	198.846	204.530	216.358	221.019
400	436.649	447.632	460.211	468.724	486.274	493.132

Source: The entries in this table were computed by the authors.

TABLE E. Critical Values of Hotelling's T^2 Distribution

Degrees of freedom for error, df_E	Number of dependent variables $\alpha = .05$					Number of dependent variables $\alpha = .01$				
	p = 1	p = 2	p = 3	p = 4	p = 5	p = 1	p = 2	p = 3	p = 4	p = 5
2	18.513					98.503				
3	10.128	57.000				34.116	297.000			
4	7.709	25.472	114.986			21.198	82.177	594.997		
5	6.608	17.361	46.383	192.468		16.258	45.000	147.283	992.494	
6	5.987	13.887	29.661	72.937	289.446	13.745	31.857	75.125	229.679	1489.489
7	5.591	12.001	22.720	44.718	105.157	12.246	25.491	50.652	111.839	329.433
8	5.318	10.828	19.028	33.230	62.561	11.259	21.821	39.118	72.908	155.219
9	5.117	10.033	16.766	27.202	45.453	10.561	19.460	32.598	54.890	98.703
10	4.965	9.459	15.248	23.545	36.561	10.044	17.826	28.466	44.838	72.882
11	4.844	9.026	14.163	21.108	31.205	9.646	16.631	25.637	38.533	58.618
12	4.747	8.689	13.350	19.376	27.656	9.330	15.722	23.588	34.251	49.739
13	4.667	8.418	12.719	18.086	25.145	9.074	15.008	22.041	31.171	43.745
14	4.600	8.197	12.216	17.089	23.281	8.862	14.433	20.834	28.857	39.454
15	4.543	8.012	11.806	16.296	21.845	8.683	13.960	19.867	27.060	36.246
16	4.494	7.856	11.465	15.651	20.706	8.531	13.566	19.076	25.626	33.762
17	4.451	7.722	11.177	15.117	19.782	8.400	13.231	18.418	24.458	31.788
18	4.414	7.606	10.931	14.667	19.017	8.285	12.943	17.861	23.487	30.182
19	4.381	7.504	10.719	14.283	18.375	8.185	12.694	17.385	22.670	28.852
20	4.351	7.415	10.533	13.952	17.828	8.096	12.476	16.973	21.972	27.734

(Continued)

TABLE E. (Continued)

Degrees of freedom for error, df_E	Number of dependent variables					Number of dependent variables				
	p = 1	p = 2	p = 3	p = 4	p = 5	p = 1	p = 2	p = 3	p = 4	p = 5
22	4.301	7.264	10.225	13.409	16.945	7.945	12.111	16.296	20.843	25.959
24	4.260	7.142	9.979	12.983	16.265	7.823	11.820	15.763	19.972	24.616
26	4.225	7.041	9.779	12.641	15.726	7.721	11.581	15.334	19.279	23.565
28	4.196	6.957	9.612	12.359	15.287	7.636	11.383	14.980	18.715	22.721
30	4.171	6.885	9.471	12.123	14.924	7.562	11.215	14.683	18.247	22.029
35	4.121	6.744	9.200	11.674	14.240	7.419	10.890	14.117	17.366	20.743
40	4.085	6.642	9.005	11.356	13.762	7.314	10.655	13.715	16.750	19.858
45	4.057	6.564	8.859	11.118	13.409	7.234	10.478	13.414	16.295	19.211
50	4.034	6.503	8.744	10.934	13.138	7.171	10.340	13.181	15.945	18.718
60	4.001	6.413	8.577	10.668	12.748	7.077	10.137	12.843	15.442	18.018
70	3.978	6.350	8.460	10.484	12.482	7.011	9.996	12.611	15.098	17.543
80	3.960	6.303	8.375	10.350	12.289	6.963	9.892	12.440	14.849	17.201
90	3.947	6.267	8.309	10.248	12.142	6.925	9.813	12.310	14.660	16.942
100	3.936	6.239	8.257	10.167	12.027	6.895	9.750	12.208	14.511	16.740
120	3.920	6.196	8.181	10.048	11.858	6.851	9.657	12.057	14.292	16.444
150	3.904	6.155	8.105	9.931	11.693	6.807	9.565	11.909	14.079	16.156
200	3.888	6.113	8.031	9.817	11.531	6.763	9.474	11.764	13.871	15.877
400	3.865	6.052	7.922	9.650	11.297	6.699	9.341	11.551	13.569	15.473
1000	3.851	6.015	7.857	9.552	11.160	6.660	9.262	11.427	13.392	15.239
∞	3.841	5.991	7.815	9.488	11.071	6.635	9.210	11.345	13.277	15.086

Source: The entries in this table were computed by the authors.

TABLE F. Critical Values of Wilks' Lambda Distribution for $\alpha = .05$

p = 1, one dependent variable

Degrees of freedom for error, df_E	Degrees of freedom for hypothesis, df_H									
	1	2	3	4	5	6	7	8	9	10
1	6.156*	2.500*	1.5436*	1.112*	.868*	.712*	.603*	.523*	.462*	.413*
2	.098	.050	.034	.025	.020	.017	.015	.013	.011	.010
3	.229	.136	.097	.076	.062	.053	.046	.041	.036	.033
4	.342	.224	.168	.135	.113	.098	.086	.076	.069	.063
5	.431	.302	.236	.194	.165	.144	.128	.115	.104	.096
6	.501	.368	.296	.249	.215	.189	.169	.153	.140	.129
7	.556	.425	.349	.298	.261	.232	.209	.190	.175	.161
8	.601	.473	.396	.343	.303	.271	.246	.225	.208	.193
9	.638	.514	.437	.382	.341	.308	.281	.258	.239	.223
10	.668	.549	.473	.418	.376	.341	.313	.289	.269	.251
11	.694	.580	.505	.450	.407	.372	.343	.318	.297	.278
12	.717	.607	.534	.479	.436	.400	.370	.345	.323	.304
13	.736	.631	.560	.506	.462	.426	.396	.370	.347	.327
14	.753	.652	.583	.529	.486	.450	.420	.393	.370	.350
15	.768	.671	.603	.551	.508	.473	.442	.415	.392	.371
16	.781	.688	.622	.571	.529	.493	.462	.436	.412	.391
17	.792	.703	.639	.589	.548	.512	.482	.455	.431	.410
18	.803	.717	.655	.606	.565	.530	.499	.473	.449	.427
19	.813	.730	.669	.621	.581	.546	.516	.490	.466	.444
20	.821	.741	.683	.636	.596	.562	.532	.505	.482	.460
30	.878	.819	.774	.736	.703	.674	.647	.623	.601	.581
40	.907	.861	.824	.793	.766	.741	.718	.696	.677	.658
60	.937	.905	.879	.856	.835	.816	.798	.781	.766	.751
80	.953	.928	.907	.889	.873	.858	.843	.829	.816	.804
100	.962	.942	.925	.910	.897	.884	.872	.860	.849	.838
120	.968	.951	.937	.925	.913	.902	.891	.882	.872	.863
140	.973	.958	.946	.935	.925	.915	.906	.897	.889	.881
160	.976	.963	.952	.943	.934	.925	.917	.909	.902	.894
180	.979	.967	.958	.949	.941	.933	.926	.919	.912	.905
200	.981	.970	.962	.954	.947	.940	.933	.926	.920	.914
250	.985	.976	.969	.963	.957	.951	.946	.941	.935	.930
300	.987	.980	.974	.969	.964	.959	.955	.950	.946	.942
350	.989	.983	.978	.973	.969	.965	.961	.957	.953	.950
400	.990	.985	.981	.977	.973	.969	.966	.962	.959	.956
600	.994	.990	.987	.984	.982	.979	.977	.975	.972	.970
800	.995	.993	.990	.988	.986	.984	.983	.981	.979	.977
1000	.996	.994	.992	.991	.989	.988	.986	.985	.983	.982

*All entries with an asterisk must be divided by 1000.

Source: The entries in this table were computed by the authors using a derivation from equation 6.15 (page 163) of Rencher (2002). For more extensive Wilks' lambda tables see Table A.9 (page 566) of the Rencher book.

TABLE F. *(Continued)*

p = 2, two dependent variables

Degrees of freedom for error, df_E	Degrees of freedom for hypothesis, df_H									
	1	2	3	4	5	6	7	8	9	10
1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	2.500*	.641*	.287*	.162*	.104*	.072*	.053*	.041*	.032*	.026*
3	.050	.018	9.528*	5.843*	3.950*	2.849*	2.152*	1.683*	1.352*	1.11*
4	.136	.062	.036	.023	.017	.012	9.554*	7.615*	6.213*	5.165*
5	.224	.117	.074	.051	.037	.028	.023	.018	.015	.013
6	.302	.175	.116	.084	.063	.049	.040	.033	.027	.023
7	.368	.230	.160	.119	.092	.074	.060	.050	.042	.036
8	.425	.280	.203	.155	.122	.099	.082	.069	.059	.051
9	.473	.326	.243	.190	.153	.126	.106	.090	.078	.068
10	.514	.367	.281	.223	.183	.152	.129	.111	.097	.085
11	.549	.404	.316	.255	.212	.179	.153	.133	.116	.102
12	.580	.437	.348	.286	.239	.204	.176	.154	.136	.120
13	.607	.467	.378	.314	.266	.229	.199	.175	.155	.138
14	.631	.495	.405	.340	.291	.252	.221	.195	.174	.156
15	.652	.519	.431	.365	.315	.275	.242	.215	.193	.174
16	.671	.542	.454	.389	.337	.296	.263	.235	.211	.191
17	.688	.562	.476	.410	.359	.317	.282	.254	.229	.208
18	.703	.581	.496	.431	.379	.337	.301	.272	.246	.225
19	.717	.598	.515	.450	.398	.355	.320	.289	.263	.241
20	.730	.614	.532	.468	.416	.373	.337	.306	.279	.256
30	.813	.725	.657	.601	.553	.512	.475	.443	.414	.388
40	.858	.786	.730	.682	.639	.602	.568	.537	.509	.484
60	.903	.853	.811	.774	.741	.710	.682	.656	.632	.609
80	.927	.887	.854	.825	.798	.772	.749	.727	.706	.686
100	.941	.909	.882	.857	.834	.813	.793	.774	.755	.738
120	.951	.924	.900	.879	.860	.841	.823	.807	.791	.775
140	.958	.934	.914	.895	.878	.862	.846	.831	.817	.803
160	.963	.942	.924	.908	.893	.878	.864	.851	.838	.825
180	.967	.949	.932	.918	.904	.891	.878	.866	.854	.843
200	.970	.954	.939	.926	.913	.901	.889	.878	.867	.857
250	.976	.963	.951	.940	.930	.920	.910	.901	.892	.883
300	.980	.969	.959	.950	.941	.933	.925	.917	.909	.902
350	.983	.973	.965	.957	.949	.942	.935	.928	.921	.915
400	.985	.977	.969	.962	.955	.949	.943	.937	.931	.925
600	.990	.984	.979	.975	.970	.966	.961	.957	.953	.949
800	.993	.988	.984	.981	.977	.974	.971	.968	.965	.962
1000	.994	.991	.987	.985	.982	.979	.977	.974	.972	.969

*All entries with an asterisk must be divided by 1000.

TABLE F. *(Continued)*

	p = 3		p = 4		p = 5		p = 6		p = 7	
	df_H		df_H		df_H		df_H		df_H	
df_E	1	2	1	2	1	2	1	2	1	2
1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000
4	.034	.010	.001	.000	.000	.000	.000	.000	.000	.000
5	.097	.036	.025	.006	.001	.000	.000	.000	.000	.000
6	.168	.074	.076	.023	.020	.004	.001	.000	.000	.000
7	.236	.116	.135	.051	.062	.017	.017	.003	.001	.000
8	.296	.160	.194	.084	.113	.037	.053	.012	.015	.002
9	.349	.203	.249	.119	.165	.063	.098	.028	.046	.010
10	.396	.243	.298	.155	.215	.092	.144	.049	.086	.023
11	.437	.281	.343	.190	.261	.122	.189	.074	.128	.040
12	.473	.316	.382	.223	.303	.153	.232	.099	.169	.060
13	.505	.348	.418	.255	.341	.183	.271	.126	.209	.082
14	.534	.378	.450	.286	.376	.212	.308	.152	.246	.106
15	.560	.405	.479	.314	.407	.239	.341	.179	.281	.129
16	.583	.431	.506	.340	.436	.266	.372	.204	.313	.153
17	.603	.454	.529	.365	.462	.291	.400	.229	.343	.176
18	.622	.476	.551	.389	.486	.315	.426	.252	.370	.199
19	.639	.496	.571	.410	.508	.337	.450	.275	.396	.221
20	.655	.515	.589	.431	.529	.359	.473	.296	.420	.242
30	.760	.648	.712	.580	.668	.519	.626	.464	.586	.413
40	.816	.724	.779	.668	.744	.617	.711	.570	.679	.526
60	.875	.808	.849	.767	.825	.729	.802	.693	.779	.660
80	.905	.853	.885	.821	.867	.791	.849	.762	.832	.735
100	.924	.881	.908	.854	.893	.830	.878	.806	.864	.783
120	.936	.900	.923	.877	.910	.856	.898	.836	.886	.817
140	.945	.913	.934	.894	.923	.876	.912	.858	.902	.841
160	.952	.924	.942	.907	.932	.891	.923	.875	.914	.860
180	.957	.932	.948	.917	.940	.902	.931	.888	.923	.875
200	.961	.939	.953	.925	.945	.912	.938	.899	.931	.887
250	.969	.951	.962	.940	.956	.929	.950	.919	.945	.909
300	.974	.959	.969	.949	.963	.940	.958	.932	.954	.923
350	.978	.965	.973	.956	.969	.949	.964	.941	.960	.934
400	.981	.969	.976	.962	.973	.955	.969	.948	.965	.942
600	.987	.979	.984	.974	.982	.970	.979	.965	.977	.961
800	.990	.984	.988	.981	.986	.977	.984	.974	.982	.971
1000	.992	.987	.991	.985	.989	.982	.987	.979	.986	.977

Note: The number of dependent variables is denoted by p for each set of two columns of lambda values.