Appendix F
Statistical Tables

Table F-1. Critical Values for Grubbs' Test

	Significance Level, "			Significance Level, "	
n	0.01	0.05	*n*	0.01	0.05
			31	3.119	2.759
			32	3.135	2.773
3	1.155	1.153	33	3.150	2.786
4	1.492	1.463	34	3.164	2.799
5	1.749	1.672	35	3.178	2.811
6	1.944	1.822	36	3.191	2.823
7	2.097	1.938	37	3.204	2.835
8	2.221	2.032	38	3.216	2.846
9	2.323	2.110	39	3.228	2.857
10	2.410	2.176	40	3.240	2.866
11	2.485	2.234	41	3.251	2.877
12	2.550	2.285	42	3.261	2.887
13	2.607	2.331	43	3.271	2.896
14	2.659	2.371	44	3.282	2.905
15	2.705	2.409	45	3.292	2.914
16	2.747	2.443	46	3.302	2.923
17	2.785	2.475	47	3.310	2.931
18	2.821	2.504	48	3.319	2.940
19	2.854	2.532	49	3.329	2.948
20	2.884	2.557	50	3.336	2.956
21	2.912	2.580			
22	2.939	2.603			
23	2.963	2.624			
24	2.987	2.644			
25	3.009	2.663			
26	3.029	2.681			
27	3.049	2.698			
28	3.068	2.714			
29	3.085	2.730			
30	3.103	2.745			

Table F-2. Percentiles of the F Distribution

Denominator		Numerator *df*															
df	1 ! "	1	2	3	4	5	6	7	8	9	10	15	20	30	60	120	4
1	0.90	39.9	49.5	53.6	55.8	57.2	58.2	58.9	59.4	59.9	60.2	61.2	61.7	62.3	62.8	63.1	63.3
	0.95	161	200	216	225	230	234	237	239	241	242	246	248	250	252	253	254
	0.975	648	800	864	900	922	937	948	957	963	969	985	993	1001	1010	1014	1018
	0.99	4052	5000	5403	5625	5764	5859	5928	5981	6022	6056	6157	6209	6261	6313	6339	6366
2	0.90	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38	9.39	9.42	9.44	9.46	9.47	9.48	9.49
	0.95	18.5	19.0	19.2	19.2	19.3	19.3	19.4	19.4	19.4	19.4	19.4	19.4	19.5	19.5	19.5	19.5
	0.975	38.5	39.0	39.2	39.2	39.3	39.3	39.4	39.4	39.4	39.4	39.4	39.4	39.5	39.5	39.5	39.5
	0.99	98.5	99.0	99.2	99.2	99.3	99.3	99.4	99.4	99.4	99.4	99.4	99.4	99.5	99.5	99.5	99.5
3	0.90	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24	5.23	5.20	5.18	5.17	5.15	5.14	5.13
	0.95	10.1	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.70	8.66	8.62	8.57	8.55	8.53
	0.975	17.4	16.0	15.4	15.1	14.9	14.7	14.6	14.5	14.5	14.4	14.3	14.2	14.1	14.0	13.9	13.9
	0.99	34.1	30.8	29.5	28.7	28.2	27.9	27.7	27.5	27.3	27.2	26.9	26.7	26.5	26.3	26.2	26.1
4	0.90	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94	3.92	3.87	3.84	3.82	3.79	3.78	3.76
	0.95	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.86	5.80	5.75	5.69	5.66	5.63
	0.975	12.2	10.6	9.98	9.60	9.36	9.20	9.07	8.98	8.90	8.84	8.66	8.56	8.46	8.36	8.31	8.26
	0.99	21.2	18.0	16.7	16.0	15.5	15.2	15.0	14.8	14.7	14.5	14.2	14.0	13.8	13.7	13.6	13.5
5	0.90	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32	3.39	3.24	3.21	3.17	3.14	3.12	3.11
	0.95	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.62	4.56	4.50	4.43	4.40	4.37
	0.975	10.0	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68	6.62	6.43	6.33	6.23	6.12	6.07	6.02
	0.99	16.3	13.3	12.1	11.4	11.0	10.7	10.5	10.3	10.2	10.1	9.72	9.55	9.38	9.20	9.11	9.02
6	0.90	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96	2.94	2.87	2.84	2.80	2.76	2.74	2.72
	0.95	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	3.94	3.87	3.81	3.74	3.70	3.67
	0.975	8.81	7.26	6.60	6.23	5.99	5.82	5.70	5.60	5.52	5.46	5.27	5.17	5.07	4.96	4.90	4.85
	0.99	22.8	10.9	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.56	7.40	7.23	7.06	6.97	6.88

Table F-2. (continued) Percentiles of the F Distribution

Denominator		Numerator *df*															
df	1 ! "	1	2	3	4	5	6	7	8	9	10	15	20	30	60	120	4
7	0.90	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72	2.70	2.63	2.59	2.56	2.51	2.49	2.47
	0.95	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.51	3.44	3.38	3.30	3.27	3.23
	0.975	8.07	6.54	5.89	5.52	5.29	5.12	4.99	4.90	4.82	4.76	4.57	4.47	4.36	4.25	4.20	4.14
	0.99	12.2	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.31	6.16	5.99	5.82	5.74	5.65
8	0.90	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56	2.54	2.46	2.42	2.38	2.34	2.32	2.29
	0.95	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.22	3.15	3.08	3.01	2.97	2.93
	0.975	7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36	4.30	4.10	4.00	3.89	3.78	3.73	3.67
	0.99	11.3	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.52	5.36	5.20	5.03	4.95	4.86
9	0.90	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44	2.42	2.34	2.30	2.25	2.21	2.18	2.16
	0.95	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.01	2.94	2.86	2.79	2.75	2.71
	0.975	7.21	5.71	5.08	4.72	4.48	4.32	4.20	4.10	4.03	3.96	3.77	3.67	3.56	3.45	3.39	3.33
	0.99	10.6	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	4.96	4.81	4.65	4.48	4.40	4.31
10	0.90	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35	2.32	2.24	2.20	2.16	2.11	2.08	2.06
	0.95	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.84	2.77	2.70	2.62	2.58	2.54
	0.975	6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.78	3.72	3.52	3.42	3.31	3.20	3.14	3.08
	0.99	10.0	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.56	4.41	4.25	4.08	4.00	3.91
12	0.90	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21	2.19	2.10	2.06	2.01	1.96	1.93	1.90
	0.95	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.62	2.54	2.47	2.38	2.34	2.30
	0.975	6.55	5.10	4.47	4.12	3.89	3.73	3.61	3.51	3.44	3.37	3.18	3.07	2.96	2.85	2.79	2.72
	0.99	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.01	3.86	3.70	3.54	3.45	3.36
15	0.90	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09	2.06	1.97	1.92	1.87	1.82	1.79	1.76
	0.95	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.40	2.33	2.25	2.16	2.11	2.07
	0.975	6.20	4.77	4.15	3.80	3.58	3.41	3.29	3.20	3.12	3.06	2.86	2.76	2.64	2.52	2.46	2.40
	0.99	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.52	3.37	3.21	3.05	2.96	2.87

Table F-2. (continued) Percentiles of the F Distribution

Denominator		Numerator *df*															
df	1 ! "	1	2	3	4	5	6	7	8	9	10	15	20	30	60	120	4
20	0.90	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96	1.94	1.84	1.79	1.74	1.68	1.64	1.61
	0.95	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.20	2.12	2.04	1.95	1.90	1.84
	0.975	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91	2.84	2.77	2.57	2.46	2.35	2.22	2.16	2.09
	0.99	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.09	2.94	2.78	2.61	2.52	2.42
24	0.90	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91	1.88	1.78	1.73	1.67	1.61	1.57	1.53
	0.95	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.11	2.03	1.94	1.84	1.79	1.73
	0.975	5.72	4.32	3.72	3.38	3.15	2.99	2.87	2.78	2.70	2.64	2.44	2.33	2.21	2.08	2.01	1.94
	0.99	7.82	6.66	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	2.89	2.74	2.58	2.40	2.31	2.21
30	0.90	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85	1.82	1.72	1.67	1.61	1.54	1.50	1.46
	0.95	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.01	1.93	1.84	1.74	1.68	1.62
	0.975	5.57	4.18	3.59	3.25	3.03	2.87	2.75	2.65	2.57	2.51	2.31	2.20	2.07	1.94	1.87	1.79
	0.99	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.70	2.55	2.39	2.21	2.11	2.01
60	0.90	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74	1.71	1.60	1.54	1.48	1.40	1.35	1.29
	0.95	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.84	1.75	1.65	1.53	1.47	1.39
	0.975	5.29	3.93	3.34	3.01	2.79	2.63	2.51	2.41	2.33	2.27	2.06	1.94	1.82	1.67	1.58	1.48
	0.99	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.35	2.20	2.03	1.84	1.73	1.60
120	0.90	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.68	1.65	1.55	1.48	1.41	1.32	1.26	1.19
	0.95	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.75	1.66	1.55	1.43	1.35	1.25
	0.975	5.15	3.80	3.23	2.89	2.67	2.52	2.39	2.30	2.22	2.16	1.95	1.82	1.69	1.53	1.43	1.31
	0.99	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.19	2.03	1.86	1.66	1.53	1.38
4	0.90	2.71	2.30	2.08	1.94	1.85	1.77	1.72	1.67	1.63	1.60	1.49	1.42	1.34	1.24	1.17	1.00
	0.95	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.67	1.57	1.46	1.32	1.22	1.00
	0.975	5.02	3.69	3.12	2.79	2.57	2.41	2.29	2.19	2.11	2.05	1.83	1.71	1.57	1.39	1.27	1.00
	0.99	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.04	1.88	1.70	1.47	1.32	1.00

Table F-3. Critical Values of Student's *t* Distribution

					1 ! "				
df	0.70	0.75	0.80	0.85	0.90	0.95	0.975	0.99	0.995
1	0.727	1.000	1.376	1.963	3.078	6.314	12.706	31.821	63.657
2	0.617	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925
3	0.584	0.765	0.978	1.250	1.638	2.353	3.182	4.451	5.841
4	0.569	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604
5	0.559	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032
6	0.553	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707
7	0.549	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499
8	0.546	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355
9	0.543	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250
10	0.542	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169
11	0.540	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106
12	0.539	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055
13	0.538	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012
14	0.537	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977
15	0.536	0.691	0.866	1.074	1.340	1.753	2.131	2.602	2.947
16	0.535	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921
17	0.534	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898
18	0.534	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878
19	0.533	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861
20	0.533	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845
21	0.532	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831
22	0.532	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819
23	0.532	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807
24	0.531	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797
25	0.531	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787
26	0.531	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779
27	0.531	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771
28	0.530	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763
29	0.530	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756
30	0.530	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750
40	0.529	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704
60	0.527	0.679	0.848	1.046	1.296	1.671	2.000	2.390	2.660
120	0.526	0.677	0.845	1.041	1.289	1.658	1.980	2.358	2.617
4	0.524	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576

Table F-4. Probabilities for the Small-Sample Mann-Kendall Test for Trend

	n					*n*		
S	4	5	8	9	S	6	7	10
0	0.625	0.592	0.548	0.540	1	0.500	0.500	0.500
2	0.375	0.408	0.452	0.460	3	0.360	0.386	0.431
4	0.167	0.242	0.360	0.381	5	0.235	0.281	0.364
6	0.042	0.117	0.274	0.306	7	0.136	0.191	0.300
8		0.042	0.199	0.238	9	0.068	0.199	0.242
10		0.0083	0.138	0.179	11	0.028	0.068	0.190
12			0.089	0.130	13	0.0083	0.035	0.146
14			0.054	0.090	15	0.0014	0.015	0.108
16			0.031	0.060	17		0.0054	0.078
18			0.016	0.038	19		0.0014	0.054
20			0.0071	0.022	21		0.00020	0.036
22			0.0028	0.012	23			0.023
24			0.00087	0.0063	25			0.014
26			0.00019	0.0029	27			0.0083
28			0.000025	0.0012	29			0.0046
30				0.00043	31			0.0023
32				0.00012	33			0.0011
34				0.000025	35			0.00047
36				0.0000028	37			0.00018
					39			0.0000458
					41			0.0000415
					43			0.0000028
					45			0.00000028

Table F-5. Factors for Determining Two-Sided Prediction Intervals for the Next Observation Given Previous Sample of Size *n*

Previous Sample Size, *n*	Probability Level		
	90%	95%	99%
2	7.733	15.562	77.964
3	3.372	4.969	11.460
4	2.631	3.558	6.530
5	2.335	3.041	5.043
6	2.176	2.777	4.355
7	2.077	2.616	3.963
8	2.010	2.508	3.711
9	1.961	2.431	3.536
10	1.922	2.372	3.409
11	1.893	2.327	3.310
12	1.869	2.291	3.233
13	1.849	2.261	3.170
14	1.833	2.236	3.118
15	1.819	2.215	3.075
16	1.807	2.197	3.038
17	1.797	2.181	3.006
18	1.788	2.168	2.977
19	1.779	2.156	2.953
20	1.772	2.145	2.932
21	1.766	2.135	2.912
22	1.760	2.127	2.895
23	1.754	2.119	2.880
24	1.749	2.112	2.865
25	1.745	2.105	2.852
26	1.741	2.099	2.840
27	1.737	2.094	2.830
28	1.733	2.088	2.820
29	1.730	2.083	2.810
30	1.727	2.079	2.802

Table F-5. (continued) Factors for Determining Two-Sided Prediction Intervals for the Next Observation Given Previous Sample of Size *n*

Previous Sample Size, *n*	Probability Level		
	90%	95%	99%
31	1.724	2.075	2.794
41	1.704	2.046	2.737
51	1.692	2.029	2.704
61	1.685	2.016	2.682
81	1.674	2.002	2.655
101	1.668	1.994	2.639
201	1.657	1.977	2.607
501	1.650	1.967	2.589
4	1.645	1.960	2.576