	1-α									
ν	0.050	0.100	0.150	0.200	0.250	0.300	0.350	0.400	0.450	0.500
1	0.004	0.016	0.036	0.064	0.102	0.148	0.206	0.275	0.357	0.455
2	0.103	0.211	0.325	0.446	0.575	0.713	0.862	1.022	1.196	1.386
3	0.352	0.584	0.798	1.005	1.213	1.424	1.642	1.869	2.109	2.366
4	0.711	1.064	1.366	1.649	1.923	2.195	2.470	2.753	3.047	3.357
5	1.145	1.610	1.994	2.343	2.675	3.000	3.325	3.655	3.996	4.351
6	1.635	2.204	2.661	3.070	3.455	3.828	4.197	4.570	4.952	5.348
7	2.167	2.833	3.358	3.822	4.255	4.671	5.082	5.493	5.913	6.346
8	2.733	3.490	4.078	4.594	5.071	5.527	5.975	6.423	6.877	7.344
9	3.325	4.168	4.817	5.380	5.899	6.393	6.876	7.357	7.843	8.343
10	3.940	4.865	5.570	6.179	6.737	7.267	7.783	8.295	8.812	9.342
11	4.575	5.578	6.336	6.989	7.584	8.148	8.695	9.237	9.783	10.341
12	5.226	6.304	7.114	7.807	8.438	9.034	9.612	10.182	10.755	11.340
13	5.892	7.042	7.901	8.634	9.299	9.926	10.532	11.129	11.729	12.340
14	6.571	7.790	8.696	9.467	10.165	10.821	11.455	12.078	12.703	13.339
15	7.261	8.547	9.499	10.307	11.037	11.721	12.381	13.030	13.679	14.339
16	7.962	9.312	10.309	11.152	11.912	12.624	13.310	13.983	14.655	15.338

Appendix A – Tables: statistical values

Table 6.2: χ^2 values

	1-α									
ν	0.050	0.100	0.150	0.200	0.250	0.300	0.350	0.400	0.450	0.500
1	0.004	0.016	0.036	0.064	0.102	0.148	0.206	0.275	0.357	0.455
2	0.103	0.211	0.325	0.446	0.575	0.713	0.862	1.022	1.196	1.386
3	0.352	0.584	0.798	1.005	1.213	1.424	1.642	1.869	2.109	2.366
4	0.711	1.064	1.366	1.649	1.923	2.195	2.470	2.753	3.047	3.357
5	1.145	1.610	1.994	2.343	2.675	3.000	3.325	3.655	3.996	4.351
6	1.635	2.204	2.661	3.070	3.455	3.828	4.197	4.570	4.952	5.348
7	2.167	2.833	3.358	3.822	4.255	4.671	5.082	5.493	5.913	6.346
8	2.733	3.490	4.078	4.594	5.071	5.527	5.975	6.423	6.877	7.344
9	3.325	4.168	4.817	5.380	5.899	6.393	6.876	7.357	7.843	8.343
10	3.940	4.865	5.570	6.179	6.737	7.267	7.783	8.295	8.812	9.342
11	4.575	5.578	6.336	6.989	7.584	8.148	8.695	9.237	9.783	10.341
12	5.226	6.304	7.114	7.807	8.438	9.034	9.612	10.182	10.755	11.340
13	5.892	7.042	7.901	8.634	9.299	9.926	10.532	11.129	11.729	12.340
14	6.571	7.790	8.696	9.467	10.165	10.821	11.455	12.078	12.703	13.339
15	7.261	8.547	9.499	10.307	11.037	11.721	12.381	13.030	13.679	14.339
16	7.962	9.312	10.309	11.152	11.912	12.624	13.310	13.983	14.655	15.338
17	8.672	10.085	11.125	12.002	12.792	13.531	14.241	14.937	15.633	16.338
18	9.390	10.865	11.946	12.857	13.675	14.440	15.174	15.893	16.611	17.338
19	10.117	11.651	12.773	13.716	14.562	15.352	16.109	16.850	17.589	18.338
20	10.851	12.443	13.604	14.578	15.452	16.266	17.046	17.809	18.569	19.337
21	11.591	13.240	14.439	15.445	16.344	17.182	17.984	18.768	19.548	20.337
22	12.338	14.041	15.279	16.314	17.240	18.101	18.924	19.729	20.529	21.337
23	13.091	14.848	16.122	17.187	18.137	19.021	19.866	20.690	21.510	22.337
24	13.848	15.659	16.969	18.062	19.037	19.943	20.808	21.652	22.491	23.337
25	14.611	16.473	17.818	18.940	19.939	20.867	21.752	22.616	23.472	24.337
26	15.379	17.292	18.671	19.820	20.843	21.792	22.697	23.579	24.454	25.336
27	16.151	18.114	19.527	20.703	21.749	22.719	23.644	24.544	25.437	26.336
28	16.928	18.939	20.386	21.588	22.657	23.647	24.591	25.509	26.419	27.336
29	17.708	19.768	21.247	22.475	23.567	24.577	25.539	26.475	27.402	28.336
30	18.493	20.599	22.110	23.364	24.478	25.508	26.488	27.442	28.386	29.336
31	19.281	21.434	22.976	24.255	25.390	26.440	27.438	28.409	29.369	30.336
32	20.072	22.271	23.844	25.148	26.304	27.373	28.389	29.376	30.353	31.336
33	20.867	23.110	24.714	26.042	27.219	28.307	29.340	30.344	31.337	32.336
34	21.664	23.952	25.586	26.938	28.136	29.242	30.293	31.313	32.322	33.336
35	22.465	24.797	26.460	27.836	29.054	30.178	31.246	32.282	33.306	34.336
36	23.269	25.643	27.336	28.735	29.973	31.115	32.200	33.252	34.291	35.336
37	24.075	26.492	28.214	29.635	30.893	32.053	33.154	34.222	35.276	36.336
38	24.884	27.343	29.093	30.537	31.815	32.992	34.109	35.192	36.262	37.335
39	25.695	28.196	29.974	31.441	32.737	33.932	35.064	36.163	37.247	38.335
40	26.509	29.051	30.856	32.345	33.660	34.872	36.021	37.134	38.233	39.335
41	27.326	29.907	31.740	33.251	34.585	35.813	36.977	38.105	39.219	40.335
42	28.144	30.765	32.626	34.157	35.510	36.755	37.935	39.077	40.205	41.335
43	28.965	31.625	33.512	35.065	36.436	37.698	38.892	40.050	41.191	42.335
44	29.787	32.487	34.400	35.974	37.363	38.641	39.851	41.022	42.177	43.335
45	30.612	33.350	35.290	36.884	38.291	39.585	40.809	41.995	43.164	44.335
46	31.439	34.215	36.180	37.795	39.220	40.529	41.769	42.968	44.150	45.335
47	32.268	35.081	37.072	38.708	40.149	41.474	42.728	43.942	45.137	46.335
48	33.098	35.949	37.965	39.621	41.079	42.420	43.689	44.915	46.124	47.335
49	33.930	36.818	38.859	40.534	42.010	43.366	44.649	45.889	47.111	48.335
50	34.764	37.689	39.754	41.449	42.942	44.313	45.610	46.864	48.099	49.335

Table 6.3: χ^2 values (continued)

	1-α									
ν	0.500	0.550	0.600	0.650	0.700	0.750	0.800	0.850	0.900	0.950
1	0.455	0.571	0.708	0.873	1.074	1.323	1.642	2.072	2.706	3.841
2	1.386	1.597	1.833	2.100	2.408	2.773	3.219	3.794	4.605	5.991
3	2.366	2.643	2.946	3.283	3.665	4.108	4.642	5.317	6.251	7.815
4	3.357	3.687	4.045	4.438	4.878	5.385	5.989	6.745	7.779	9.488
5	4.351	4.728	5.132	5.573	6.064	6.626	7.289	8.115	9.236	11.070
6	5.348	5.765	6.211	6.695	7.231	7.841	8.558	9.446	10.645	12.592
7	6.346	6.800	7.283	7.806	8.383	9.037	9.803	10.748	12.017	14.067
8	7.344	7.833	8.351	8.909	9.524	10.219	11.030	12.027	13.362	15.507
9	8.343	8.863	9.414	10.006	10.656	11.389	12.242	13.288	14.684	16.919
10	9.342	9.892	10.473	11.097	11.781	12.549	13.442	14.534	15.987	18.307
11	10.341	10.920	11.530	12.184	12.899	13.701	14.631	15.767	17.275	19.675
12	11.340	11.946	12.584	13.266	14.011	14.845	15.812	16.989	18.549	21.026
13	12.340	12.972	13.636	14.345	15.119	15.984	16.985	18.202	19.812	22.362
14	13.339	13.996	14.685	15.421	16.222	17.117	18.151	19.406	21.064	23.685
15	14.339	15.020	15.733	16.494	17.322	18.245	19.311	20.603	22.307	24.996
16	15.338	16.042	16.780	17.565	18.418	19.369	20.465	21.793	23.542	26.296
17	16.338	17.065	17.824	18.633	19.511	20.489	21.615	22.977	24.769	27.587
18	17.338	18.086	18.868	19.699	20.601	21.605	22.760	24.155	25.989	28.869
19	18.338	19.107	19.910	20.764	21.689	22.718	23.900	25.329	27.204	30.144
20	19.337	20.127	20.951	21.826	22.775	23.828	25.038	26.498	28.412	31.410
21	20.337	21.147	21.991	22.888	23.858	24.935	26.171	27.662	29.615	32.671
22	21.337	22.166	23.031	23.947	24.939	26.039	27.301	28.822	30.813	33.924
23	22.337	23.185	24.069	25.006	26.018	27.141	28.429	29.979	32.007	35.172
24	23.337	24.204	25.106	26.063	27.096	28.241	29.553	31.132	33.196	36.415
25	24.337	25.222	26.143	27.118	28.172	29.339	30.675	32.282	34.382	37.652
26	25.336	26.240	27.179	28.173	29.246	30.435	31.795	33.429	35.563	38.885
27	26.336	27.257	28.214	29.227	30.319	31.528	32.912	34.574	36.741	40.113
28	27.336	28.274	29.249	30.279	31.391	32.620	34.027	35.715	37.916	41.337
29	28.336	29.291	30.283	31.331	32.461	33.711	35.139	36.854	39.087	42.557
30	29.336	30.307	31.316	32.382	33.530	34.800	36.250	37.990	40.256	43.773
31	30.336	31.323	32.349	33.431	34.598	35.887	37.359	39.124	41.422	44.985
32	31.336	32.339	33.381	34.480	35.665	36.973	38.466	40.256	42.585	46.194
33	32.336	33.355	34.413	35.529	36.731	38.058	39.572	41.386	43.745	47.400
34	33.336	34.371	35.444	36.576	37.795	39.141	40.676	42.514	44.903	48.602
35	34.336	35.386	36.475	37.623	38.859	40.223	41.778	43.640	46.059	49.802
36	35.336	36.401	37.505	38.669	39.922	41.304	42.879	44.764	47.212	50.998
37	36.336	37.416	38.535	39.715	40.984	42.383	43.978	45.886	48.363	52.192
38	37.335	38.430	39.564	40.760	42.045	43.462	45.076	47.007	49.513	53.384
39	38.335	39.445	40.593	41.804	43.105	44.539	46.173	48.126	50.660	54.572
40	39.335	40.459	41.622	42.848	44.165	45.616	47.269	49.244	51.805	55.758
41	40.335	41.473	42.651	43.891	45.224	46.692	48.363	50.360	52.949	56.942
42	41.335	42.487	43.679	44.934	46.282	47.766	49.456	51.475	54.090	58.124
43	42.335	43.501	44.706	45.976	47.339	48.840	50.548	52.588	55.230	59.304
44	43.335	44.514	45.734	47.017	48.396	49.913	51.639	53.700	56.369	60.481
45	44.335	45.527	46.761	48.058	49.452	50.985	52.729	54.810	57.505	61.656
46	45.335	46.541	47.787	49.099	50.507	52.056	53.818	55.920	58.641	62.830
47	46.335	47.554	48.814	50.139	51.562	53.127	54.906	57.028	59.774	64.001
48	47.335	48.567	49.840	51.179	52.616	54.196	55.993	58.135	60.907	65.171
49	48.335	49.580	50.866	52.219	53.670	55.265	57.079	59.241	62.038	66.339
50	49.335	50.592	51.892	53.258	54.723	56.334	58.164	60.346	63.167	67.505

Table 6.4: Student t-distribution (upper critical one-tailed values)

	1-α/2											
$n-1$	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975
1	0.727	0.854	1.000	1.171	1.376	1.632	1.963	2.414	3.078	4.165	6.314	12.706
2	0.617	0.713	0.816	0.931	1.061	1.210	1.386	1.604	1.886	2.282	2.920	4.303
3	0.584	0.671	0.765	0.866	0.978	1.105	1.250	1.423	1.638	1.924	2.353	3.182
4	0.569	0.652	0.741	0.836	0.941	1.057	1.190	1.344	1.533	1.778	2.132	2.776
5	0.559	0.641	0.727	0.819	0.920	1.031	1.156	1.301	1.476	1.699	2.015	2.571
6	0.553	0.633	0.718	0.808	0.906	1.013	1.134	1.273	1.440	1.650	1.943	2.447
7	0.549	0.628	0.711	0.800	0.896	1.001	1.119	1.254	1.415	1.617	1.895	2.365
8	0.546	0.624	0.706	0.794	0.889	0.993	1.108	1.240	1.397	1.592	1.860	2.306
9	0.543	0.621	0.703	0.790	0.883	0.986	1.100	1.230	1.383	1.574	1.833	2.262
10	0.542	0.619	0.700	0.786	0.879	0.980	1.093	1.221	1.372	1.559	1.812	2.228
11	0.540	0.617	0.697	0.783	0.876	0.976	1.088	1.214	1.363	1.548	1.796	2.201
12	0.539	0.615	0.695	0.781	0.873	0.972	1.083	1.209	1.356	1.538	1.782	2.179
13	0.538	0.614	0.694	0.779	0.870	0.969	1.079	1.204	1.350	1.530	1.771	2.160
14	0.537	0.613	0.692	0.777	0.868	0.967	1.076	1.200	1.345	1.523	1.761	2.145
15	0.536	0.612	0.691	0.776	0.866	0.965	1.074	1.197	1.341	1.517	1.753	2.131
16	0.535	0.611	0.690	0.774	0.865	0.963	1.071	1.194	1.337	1.512	1.746	2.120
17	0.534	0.610	0.689	0.773	0.863	0.961	1.069	1.191	1.333	1.508	1.740	2.110
18	0.534	0.609	0.688	0.772	0.862	0.960	1.067	1.189	1.330	1.504	1.734	2.101
19	0.533	0.609	0.688	0.771	0.861	0.958	1.066	1.187	1.328	1.500	1.729	2.093
20	0.533	0.608	0.687	0.771	0.860	0.957	1.064	1.185	1.325	1.497	1.725	2.086
21	0.532	0.608	0.686	0.770	0.859	0.956	1.063	1.183	1.323	1.494	1.721	2.080
22	0.532	0.607	0.686	0.769	0.858	0.955	1.061	1.182	1.321	1.492	1.717	2.074
23	0.532	0.607	0.685	0.769	0.858	0.954	1.060	1.180	1.319	1.489	1.714	2.069
24	0.531	0.606	0.685	0.768	0.857	0.953	1.059	1.179	1.318	1.487	1.711	2.064
25	0.531	0.606	0.684	0.767	0.856	0.952	1.058	1.178	1.316	1.485	1.708	2.060
26	0.531	0.606	0.684	0.767	0.856	0.952	1.058	1.177	1.315	1.483	1.706	2.056
27	0.531	0.605	0.684	0.767	0.855	0.951	1.057	1.176	1.314	1.482	1.703	2.052
28	0.530	0.605	0.683	0.766	0.855	0.950	1.056	1.175	1.313	1.480	1.701	2.048
29	0.530	0.605	0.683	0.766	0.854	0.950	1.055	1.174	1.311	1.479	1.699	2.045
30	0.530	0.605	0.683	0.765	0.854	0.949	1.055	1.173	1.310	1.477	1.697	2.042
31	0.530	0.604	0.682	0.765	0.853	0.949	1.054	1.172	1.309	1.476	1.696	2.040
32	0.530	0.604	0.682	0.765	0.853	0.948	1.054	1.172	1.309	1.475	1.694	2.037
33	0.530	0.604	0.682	0.765	0.853	0.948	1.053	1.171	1.308	1.474	1.692	2.035
34	0.529	0.604	0.682	0.764	0.852	0.948	1.052	1.170	1.307	1.473	1.691	2.032
35	0.529	0.604	0.682	0.764	0.852	0.947	1.052	1.170	1.306	1.472	1.690	2.030
36	0.529	0.603	0.681	0.764	0.852	0.947	1.052	1.169	1.306	1.471	1.688	2.028
37	0.529	0.603	0.681	0.764	0.851	0.947	1.051	1.169	1.305	1.470	1.687	2.026
38	0.529	0.603	0.681	0.763	0.851	0.946	1.051	1.168	1.304	1.469	1.686	2.024
39	0.529	0.603	0.681	0.763	0.851	0.946	1.050	1.168	1.304	1.468	1.685	2.023
40	0.529	0.603	0.681	0.763	0.851	0.946	1.050	1.167	1.303	1.468	1.684	2.021
41	0.529	0.603	0.681	0.763	0.850	0.945	1.050	1.167	1.303	1.467	1.683	2.020
42	0.528	0.603	0.680	0.763	0.850	0.945	1.049	1.166	1.302	1.466	1.682	2.018
43	0.528	0.603	0.680	0.762	0.850	0.945	1.049	1.166	1.302	1.466	1.681	2.017
44	0.528	0.602	0.680	0.762	0.850	0.945	1.049	1.166	1.301	1.465	1.680	2.015
45	0.528	0.602	0.680	0.762	0.850	0.944	1.049	1.165	1.301	1.465	1.679	2.014
46	0.528	0.602	0.680	0.762	0.850	0.944	1.048	1.165	1.300	1.464	1.679	2.013
47	0.528	0.602	0.680	0.762	0.849	0.944	1.048	1.165	1.300	1.463	1.678	2.012
48	0.528	0.602	0.680	0.762	0.849	0.944	1.048	1.164	1.299	1.463	1.677	2.011
49	0.528	0.602	0.680	0.762	0.849	0.944	1.048	1.164	1.299	1.462	1.677	2.010
50	0.528	0.602	0.679	0.761	0.849	0.943	1.047	1.164	1.299	1.462	1.676	2.009
51	0.528	0.602	0.679	0.761	0.849	0.943	1.047	1.164	1.298	1.462	1.675	2.008
52	0.528	0.602	0.679	0.761	0.849	0.943	1.047	1.163	1.298	1.461	1.675	2.007
53	0.528	0.602	0.679	0.761	0.848	0.943	1.047	1.163	1.298	1.461	1.674	2.006
54	0.528	0.602	0.679	0.761	0.848	0.943	1.046	1.163	1.297	1.460	1.674	2.005
55	0.527	0.601	0.679	0.761	0.848	0.943	1.046	1.163	1.297	1.460	1.673	2.004
Inf	0.525	0.598	0.675	0.756	0.842	0.935	1.037	1.151	1.282	1.441	1.646	1.962