ONLINE APPENDIX D: STATISTICAL TABLES

1 Areas under the standard normal curve

Table 1 provides details of the proportion of the area under the standard normal curve lying in the body below and in the tail beyond particular *z*-scores. The table can be used either to identify probability levels associated with particular *z*-scores or to identify *z*-scores associated with particular probabilities.

For example, to find out the probability of events associated with a *z*-score greater than 1.46, look for 1.46 in the left-hand column of the table labelled '*z*' and read off the area that lies in the tail beyond that *z*-score in the adjacent column. In this case the value is .072. This means that 1.46 cuts off .072 × 100% of the total area. In other words, 7.2% of scores will be greater (and 92.8% will be equal to or less) than 1.46 standard deviations above the mean.

On the other hand, to find out what *z*-value has to be exceeded to cut off 5% of the area, look for the first value that is equal to, or is less than, .05 in the column labelled 'Area in tail beyond *z*' and read off the associated *z*-score. In this case the required value is 1.65. This means that in order to cut off 5% or less of the population, a *z*-score has to be greater than or equal to 1.65. The value for a two-tailed test would be the value that cuts off .025 (i.e. .05/2) of the population in each tail. The corresponding value of *z* is 1.96.

Table 1 Areas under the standard normal curve

z	Area in body below *z*	Area in tail beyond *z*	*z*	Area in body below *z*	Area in tail beyond *z*	*z*	Area in body below *z*	Area in tail beyond *z*
0.00	.500	.500	0.38	.648	.352	0.76	.776	.224
0.01	.504	.496	0.39	.652	.348	0.77	.779	.221
0.02	.508	.492	0.40	.655	.345	0.78	.782	.218
0.03	.512	.488	0.41	.659	.341	0.79	.785	.215
0.04	.516	.484	0.42	.663	.337	0.80	.788	.212
0.05	.520	.480	0.43	.666	.334	0.81	.791	.209
0.06	.524	.476	0.44	.670	.330	0.82	.794	.206
0.07	.528	.472	0.45	.674	.326	0.83	.797	.203
0.08	.532	.468	0.46	.677	.323	0.84	.800	.200
0.09	.536	.464	0.47	.681	.319	0.85	.802	.198
0.10	.540	.460	0.48	.684	.316	0.86	.805	.195
0.11	.544	.456	0.49	.688	.312	0.87	.808	.192
0.12	.548	.452	0.50	.691	.309	0.88	.811	.189
0.13	.552	.448	0.51	.695	.305	0.89	.813	.187
0.14	.556	.444	0.52	.698	.302	0.90	.816	.184

0.15	.560	.440	0.53	.702	.298	0.91	.819	.181
0.16	.564	.436	0.54	.705	.295	0.92	.821	.179
0.17	.567	.433	0.55	.709	.291	0.93	.824	.176
0.18	.571	.429	0.56	.712	.288	0.94	.826	.174
0.19	.575	.425	0.57	.716	.284	0.95	.829	.171
0.20	.579	.421	0.58	.719	.281	0.96	.831	.169
0.21	.583	.417	0.59	.722	.278	0.97	.834	.166
0.22	.587	.413	0.60	.726	.274	0.98	.836	.164
0.23	.591	.409	0.61	.729	.271	0.99	.839	.161
0.24	.595	.405	0.62	.732	.268	1.00	.841	.159
0.25	.599	.401	0.63	.736	.264	1.01	.844	.156
0.26	.603	.397	0.64	.739	.261	1.02	.846	.154
0.27	.606	.394	0.65	.742	.258	1.03	.848	.152
0.28	.610	.390	0.66	.745	.255	1.04	.851	.149
0.29	.614	.386	0.67	.749	.251	1.05	.853	.147
0.30	.618	.382	0.68	.752	.248	1.06	.855	.145
0.31	.622	.378	0.69	.755	.245	1.07	.858	.142
0.32	.626	.374	0.70	.758	.242	1.08	.860	.140
0.33	.629	.371	0.71	.761	.239	1.09	.862	.138
0.34	.633	.367	0.72	.764	.236	1.10	.864	.136
0.35	.637	.363	0.73	.767	.233	1.11	.867	.133
0.36	.641	.359	0.74	.770	.230	1.12	.869	.131
0.37	.644	.356	0.75	.773	.227	1.13	.871	.129
1.14	.873	.127	1.64	.949	.051	2.14	.984	.016
1.15	.875	.125	1.65	.951	.049	2.15	.984	.016
1.16	.877	.123	1.66	.952	.048	2.16	.985	.015
1.17	.879	.121	1.67	.953	.047	2.17	.985	.015
1.18	.881	.119	1.68	.954	.046	2.18	.985	.015
1.19	.883	.117	1.69	.954	.046	2.19	.986	.014
1.20	.885	.115	1.70	.955	.045	2.20	.986	.014
1.21	.887	.113	1.71	.956	.044	2.21	.986	.014
1.22	.889	.111	1.72	.957	.043	2.22	.987	.013
1.23	.891	.109	1.73	.958	.042	2.23	.987	.013
1.24	.893	.107	1.74	.959	.041	2.24	.987	.013
1.25	.894	.106	1.75	.960	.040	2.25	.988	.012
1.26	.896	.104	1.76	.961	.039	2.26	.988	.012
1.27	.898	.102	1.77	.962	.038	2.27	.988	.012
1.28	.900	.100	1.78	.962	.038	2.28	.989	.011
1.29	.901	.099	1.79	.963	.037	2.29	.989	.011
1.30	.903	.097	1.80	.964	.036	2.30	.989	.011
1.31	.905	.095	1.81	.965	.035	2.31	.990	.010
1.32	.907	.093	1.82	.966	.034	2.32	.990	.010
1.33	.908	.092	1.83	.966	.034	2.33	.990	.010
1.34	.910	.090	1.84	.967	.033	2.34	.990	.010
1.35	.911	.089	1.85	.968	.032	2.35	.991	.009
1.36	.913	.087	1.86	.969	.031	2.36	.991	.009
1.37	.915	.085	1.87	.969	.031	2.37	.991	.009

1.38	.916	.084	1.88	.970	.030	2.38	.991	.009
1.39	.918	.082	1.89	.971	.029	2.39	.992	.008
1.40	.919	.081	1.90	.971	.029	2.40	.992	.008
1.41	.921	.079	1.91	.972	.028	2.41	.992	.008
1.42	.922	.078	1.92	.973	.027	2.42	.992	.008
1.43	.924	.076	1.93	.973	.027	2.43	.992	.008
1.44	.925	.075	1.94	.974	.026	2.44	.993	.007
1.45	.926	.074	1.95	.974	.026	2.45	.993	.007
1.46	.928	.072	1.96	.975	.025	2.46	.993	.007
1.47	.929	.071	1.97	.976	.024	2.47	.993	.007
1.48	.931	.069	1.98	.976	.024	2.48	.993	.007
1.49	.932	.068	1.99	.977	.023	2.49	.994	.006
1.50	.933	.067	2.00	.977	.023	2.50	.994	.006
1.51	.934	.066	2.01	.978	.022	2.51	.994	.006
1.52	.936	.064	2.02	.978	.022	2.52	.994	.006
1.53	.937	.063	2.03	.979	.021	2.53	.994	.006
1.54	.938	.062	2.04	.979	.021	2.54	.994	.006
1.55	.939	.061	2.05	.980	.020	2.55	.995	.005
1.56	.941	.059	2.06	.980	.020	2.56	.995	.005
1.57	.942	.058	2.07	.981	.019	2.57	.995	.005
1.58	.943	.057	2.08	.981	.019	2.58	.995	.005
1.59	.944	.056	2.09	.982	.018	2.59	.995	.005
1.60	.945	.055	2.10	.982	.018	2.60	.995	.005
1.61	.946	.054	2.11	.983	.017	2.61	.995	.005
1.62	.947	.053	2.12	.983	.017	2.62	.996	.004
1.63	.948	.052	2.13	.983	.017	2.63	.996	.004
2.64	.996	.004	2.76	.997	.003	2.88	.998	.002
2.65	.996	.004	2.77	.997	.003	2.89	.998	.002
2.66	.996	.004	2.78	.997	.003	2.90	.998	.002
2.67	.996	.004	2.79	.997	.003	2.91	.998	.002
2.68	.996	.004	2.80	.997	.003	2.92	.998	.002
2.69	.996	.004	2.81	.998	.002	2.93	.998	.002
2.70	.997	.003	2.82	.998	.002	2.94	.998	.002
2.71	.997	.003	2.83	.998	.002	2.95	.998	.002
2.72	.997	.003	2.84	.998	.002	2.96	.998	.002
2.73	.997	.003	2.85	.998	.002	2.97	.999	.001
2.74	.997	.003	2.86	.998	.002	2.98	.999	.001
2.75	.997	.003	2.87	.998	.002	2.99	.999	.001

2 Critical values of the *t*-distribution

Table 2 provides critical values of the *t*-distribution to be used in conjunction with calculation of a *t*-value. To use the table, follow the steps below:

1 Look for the row with the appropriate number of degrees of freedom (*df*). If the exact number does not appear in the table look for the next smaller value of the degrees of

freedom (e.g. 43 degrees of freedom does not appear in the table, so look up 42 degrees of freedom instead).

2 Look across the columns until you find the largest value of *t* in that row which is smaller than the value obtained from calculation. The value at the very top of that column is the *p*-value that you should report, but …

3 If you are using a one-tailed test then use the *p*-value in the row that is labelled 'one tail'. Generally speaking, you should only do a one-tailed test if you have a directional hypothesis and are certain that this is the appropriate test.

Note: In the table the columns in **bold** highlight commonly used alpha levels.

For example, if the calculated *t* is 2.41, with 57 degrees of freedom, then to find the *p*-value for a two-tailed test, go to the row with *df* = 55 and look along this to find the first value that 2.41 exceeds. In this case the value is 2.396 and this corresponds to a two-tailed *p*-value of .02. Full results of this *t*-test could then be reported as: $t(57) = 2.41$, $p < .02$.

The relevant lines in the table are reproduced below, with relevant numbers in boxes:

Probability levels (*p*)																
two tails	.5	.4	.3	.2	**.1**	.09	.08	.07	.06	**.05**	.04	.03	.02	**.01**	.005	**.001**
one tail	.25	.2	.15	.1	**.05**	.045	.04	.035	.03	**.025**	.02	.015	.01	**.005**	.0025	**.0005**
55	0.679	0.848	1.046	1.297	**1.673**	1.726	1.784	1.848	1.920	**2.004**	2.104	2.228	2.396	**2.668**	2.925	**3.476**

Table 2 Critical values of the *t*-distribution

Probability levels (*p*)																
two tails	.5	.4	.3	.2	**.1**	.09	.08	.07	.06	**.05**	.04	.03	.02	**.01**	.005	**.001**
one tail	.25	.2	.15	.1	**.05**	.045	.04	.035	.03	**.025**	.02	.015	.01	**.005**	.0025	**.0005**
df 1	1.000	1.376	1.963	3.078	**6.314**	7.026	7.916	9.058	10.579	**12.706**	15.895	21.205	31.821	**63.657**	127.321	**636.619**
2	0.816	1.061	1.386	1.886	**2.920**	3.104	3.320	3.578	3.896	**4.303**	4.849	5.643	6.965	**9.925**	14.089	**31.599**
3	0.765	0.978	1.250	1.638	**2.353**	2.471	2.605	2.763	2.951	**3.182**	3.482	3.896	4.541	**5.841**	7.453	**12.924**
4	0.741	0.941	1.190	1.533	**2.132**	2.226	2.333	2.456	2.601	**2.776**	2.999	3.298	3.747	**4.604**	5.598	**8.610**
5	0.727	0.920	1.156	1.476	**2.015**	2.098	2.191	2.297	2.422	**2.571**	2.757	3.003	3.365	**4.032**	4.773	**6.869**
6	0.718	0.906	1.134	1.440	**1.943**	2.019	2.104	2.201	2.313	**2.447**	2.612	2.829	3.143	**3.707**	4.317	**5.959**
7	0.711	0.896	1.119	1.415	**1.895**	1.966	2.046	2.136	2.241	**2.365**	2.517	2.715	2.998	**3.499**	4.029	**5.408**
8	0.706	0.889	1.108	1.397	**1.860**	1.928	2.004	2.090	2.189	**2.306**	2.449	2.634	2.896	**3.355**	3.833	**5.041**
9	0.703	0.883	1.100	1.383	**1.833**	1.899	1.973	2.055	2.150	**2.262**	2.398	2.574	2.821	**3.250**	3.690	**4.781**
10	0.700	0.879	1.093	1.372	**1.812**	1.877	1.948	2.028	2.120	**2.228**	2.359	2.527	2.764	**3.169**	3.581	**4.587**
11	0.697	0.876	1.088	1.363	**1.796**	1.859	1.928	2.007	2.096	**2.201**	2.328	2.491	2.718	**3.106**	3.497	**4.437**
12	0.695	0.873	1.083	1.35	**1.782**	1.84	1.91	1.98	2.076	**2.179**	2.303	2.461	2.681	**3.055**	3.428	**4.318**

				6		4	2	9								
13	0.694	0.870	1.079	1.350	**1.771**	1.832	1.899	1.974	2.060	**2.160**	2.282	2.436	2.650	**3.012**	3.372	**4.221**
14	0.692	0.868	1.076	1.345	**1.761**	1.821	1.887	1.962	2.046	**2.145**	2.264	2.415	2.624	**2.977**	3.326	**4.140**
15	0.691	0.866	1.074	1.341	**1.753**	1.812	1.878	1.951	2.034	**2.131**	2.249	2.397	2.602	**2.947**	3.286	**4.073**
16	0.690	0.865	1.071	1.337	**1.746**	1.805	1.869	1.942	2.024	**2.120**	2.235	2.382	2.583	**2.921**	3.252	**4.015**
17	0.689	0.863	1.069	1.333	**1.740**	1.798	1.862	1.934	2.015	**2.110**	2.224	2.368	2.567	**2.898**	3.222	**3.965**
18	0.688	0.862	1.067	1.330	**1.734**	1.792	1.855	1.926	2.007	**2.101**	2.214	2.356	2.552	**2.878**	3.197	**3.922**
19	0.688	0.861	1.066	1.328	**1.729**	1.786	1.850	1.920	2.000	**2.093**	2.205	2.346	2.539	**2.861**	3.174	**3.883**
20	0.687	0.860	1.064	1.325	**1.725**	1.782	1.844	1.914	1.994	**2.086**	2.197	2.336	2.528	**2.845**	3.153	**3.850**
22	0.686	0.858	1.061	1.321	**1.717**	1.773	1.835	1.905	1.983	**2.074**	2.183	2.320	2.508	**2.819**	3.119	**3.792**
24	0.685	0.857	1.059	1.318	**1.711**	1.767	1.828	1.896	1.974	**2.064**	2.172	2.307	2.492	**2.797**	3.091	**3.745**
26	0.684	0.856	1.058	1.315	**1.706**	1.761	1.822	1.890	1.967	**2.056**	2.162	2.296	2.479	**2.779**	3.067	**3.707**
28	0.683	0.855	1.056	1.313	**1.701**	1.756	1.817	1.884	1.960	**2.048**	2.154	2.286	2.467	**2.763**	3.047	**3.674**
30	0.683	0.854	1.055	1.310	**1.697**	1.752	1.812	1.879	1.955	**2.042**	2.147	2.278	2.457	**2.750**	3.030	**3.646**
32	0.682	0.853	1.054	1.309	**1.694**	1.748	1.808	1.875	1.950	**2.037**	2.141	2.271	2.449	**2.738**	3.015	**3.622**
34	0.682	0.852	1.052	1.307	**1.691**	1.745	1.805	1.871	1.946	**2.032**	2.136	2.265	2.441	**2.728**	3.002	**3.601**
36	0.681	0.852	1.052	1.306	**1.688**	1.742	1.802	1.867	1.942	**2.028**	2.131	2.260	2.434	**2.719**	2.990	**3.582**
38	0.681	0.851	1.051	1.304	**1.686**	1.740	1.799	1.864	1.939	**2.024**	2.127	2.255	2.429	**2.712**	2.980	**3.566**
40	0.681	0.851	1.050	1.303	**1.684**	1.737	1.796	1.862	1.936	**2.021**	2.123	2.250	2.423	**2.704**	2.971	**3.551**
45	0.680	0.850	1.049	1.301	**1.679**	1.733	1.791	1.856	1.929	**2.014**	2.115	2.241	2.412	**2.690**	2.952	**3.520**
50	0.679	0.849	1.047	1.299	**1.676**	1.729	1.787	1.852	1.924	**2.009**	2.109	2.234	2.403	**2.678**	2.937	**3.496**
55	0.679	0.848	1.046	1.297	**1.673**	1.726	1.784	1.848	1.920	**2.004**	2.104	2.228	2.396	**2.668**	2.925	**3.476**
60	0.679	0.848	1.045	1.296	**1.671**	1.723	1.781	1.845	1.917	**2.000**	2.099	2.223	2.390	**2.660**	2.915	**3.460**
65	0.678	0.847	1.045	1.295	**1.669**	1.721	1.778	1.842	1.914	**1.997**	2.096	2.219	2.385	**2.654**	2.906	**3.447**
70	0.678	0.847	1.044	1.294	**1.667**	1.719	1.776	1.840	1.912	**1.994**	2.093	2.215	2.381	**2.648**	2.899	**3.435**
75	0.678	0.846	1.044	1.293	**1.665**	1.718	1.775	1.838	1.910	**1.992**	2.090	2.212	2.377	**2.643**	2.892	**3.425**
80	0.678	0.846	1.043	1.292	**1.664**	1.716	1.773	1.836	1.908	**1.990**	2.088	2.209	2.374	**2.639**	2.887	**3.416**
85	0.677	0.846	1.043	1.292	**1.663**	1.715	1.772	1.835	1.906	**1.988**	2.086	2.207	2.371	**2.635**	2.882	**3.409**
90	0.677	0.846	1.042	1.291	**1.662**	1.714	1.771	1.834	1.905	**1.987**	2.084	2.205	2.368	**2.632**	2.878	**3.402**
95	0.677	0.845	1.042	1.291	**1.661**	1.713	1.770	1.833	1.904	**1.985**	2.082	2.203	2.366	**2.629**	2.874	**3.396**
100	0.677	0.845	1.042	1.290	**1.660**	1.712	1.769	1.832	1.902	**1.984**	2.081	2.201	2.364	**2.626**	2.871	**3.390**
105	0.677	0.845	1.042	1.290	**1.659**	1.711	1.768	1.831	1.901	**1.983**	2.080	2.200	2.362	**2.623**	2.868	**3.386**
110	0.677	0.845	1.041	1.28	**1.659**	1.71	1.76	1.83	1.900	**1.982**	2.078	2.199	2.361	**2.621**	2.865	**3.381**

				9		0	7	0								
115	0.677	0.845	1.041	1.289	**1.658**	1.710	1.766	1.829	1.900	**1.981**	2.077	2.197	2.359	**2.619**	2.862	**3.377**
120	0.677	0.845	1.041	1.289	**1.658**	1.709	1.766	1.828	1.899	**1.980**	2.076	2.196	2.358	**2.617**	2.860	**3.373**
∞	0.674	0.842	1.036	1.282	**1.645**	1.695	1.751	1.812	1.881	**1.960**	2.054	2.170	2.326	**2.576**	2.807	**3.291**

3 Critical values of Pearson's *r*

Table 3 provides critical values of Pearson's *r* to be used in conjunction with calculation of a correlation coefficient. To use the table, follow the steps below:

1 Look for the row with the appropriate number of degrees of freedom (*df*). If the exact number does not appear in the table look for the next smaller value of the degrees of freedom (e.g. 33 degrees of freedom does not appear in the table, so look up 30 degrees of freedom instead).

2 Look across the columns until you find the largest value of *r* in that row which is smaller than the absolute (unsigned) value obtained from calculation. The value at the top of that column is the *p*-value that you should report.

For example, if the calculated *r* is −.27, with 84 degrees of freedom, then to find the *p*-value, go to the row with *df* = 80 and look along this to find the first value that .27 exceeds. In this case the value is .257 and this corresponds to a two-tailed *p*-value of .02 (and a one-tailed *p*-value of .01). In this case full results of the correlation could then be reported like this: $r(84) = -.27$, $p < .02$).

The relevant lines in the table are reproduced below, with relevant numbers in boxes:

df	Probability levels for two-tailed test (*p*)			
	.10	.05	.02	.01
80	.183	.217	.257	.283

Table 3 Critical values of Pearson's *r*

df	Probability levels for two-tailed test (*p*)			
	.10	.05	.02	.01
1	.988	.997	.9995	.9999
2	.900	.950	.980	.990
3	.805	.878	.934	.959
4	.729	.811	.882	.917
5	.669	.754	.833	.875
6	.621	.707	.789	.834
7	.582	.666	.750	.798
8	.549	.632	.715	.765
9	.521	.602	.685	.735
10	.497	.576	.658	.708
11	.476	.553	.634	.684
12	.458	.532	.612	.661
13	.441	.514	.592	.641
14	.426	.497	.574	.623
15	.412	.482	.558	.606
16	.400	.468	.543	.590
17	.389	.456	.529	.575
18	.378	.444	.516	.561

19	.369	.433	.503	.549
20	.360	.423	.492	.537
21	.352	.413	.482	.526
22	.344	.404	.472	.515
23	.337	.396	.462	.505
24	.330	.388	.453	.496
25	.323	.381	.445	.487
26	.317	.374	.437	.479
27	.311	.367	.430	.471
28	.306	.361	.423	.463
29	.301	.355	.416	.456
30	.296	.349	.409	.449
35	.275	.325	.381	.418
40	.257	.304	.358	.393
45	.243	.288	.338	.372
50	.231	.273	.322	.354
60	.211	.250	.295	.325
70	.195	.232	.274	.302
80	.183	.217	.257	.283
90	.173	.205	.242	.267
100	.164	.195	.230	.254
200	.116	.138	.164	.181
500	.073	.088	.104	.115
1000	.052	.062	.073	.081

4 Critical values of the *F*-distribution

Table 4 provides critical values of the *F*-distribution to be used in conjunction with calculation of a *F*-value. To use the table, follow the steps below:

1 Look for the row with the appropriate number of degrees of freedom for the denominator and then the column with the appropriate number of degrees of freedom for the numerator. If the exact number does not appear in the column or row, look for the column or row with the next smallest value of the degrees of freedom (e.g. there is no row for 62 degrees of freedom, so instead look at the row for 60 degrees of freedom).

2 For each pair of degrees of freedom three *F*-values are listed. These correspond to three commonly used alpha levels (α = .05, .01 and .5). Find the largest of these three values which is smaller than the *F*-value obtained from calculation. The value in the second column at the left of the table corresponding to the critical value found is the *p*-value that you should report.

For example, if the calculated *F* is 5.32, with (2, 62) degrees of freedom, then to find the *F*-value, go to the column with *df* = 2 and the row with *df* = 60. Look down the three listed values to find the largest value that 5.32 exceeds. In this case the value is 4.98 and this corresponds to an *F*-value of .01. Full results of this *F*-test could then be reported as: $F(2, 62) = 5.32$, $p < .01$.

The relevant lines in the table are reproduced below, with relevant numbers in boxes:

Denominator degrees of freedom	Numerator degrees of freedom			
	α	1	2	3
60	0.05	4.00	3.15	2.76
	0.01	7.08	4.98	4.13
	0.005	8.49	5.79	4.73
65	0.05	3.99	3.14	2.75
	0.01	7.04	4.95	4.10
	0.005	8.44	5.75	4.69

Table 4 Critical values of the *F*-distribution (Smithson 2000, pp. 426–429)

Denominator degrees of freedom	Numerator degrees of freedom																							
	α	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25	30	40	50	60	80	100
1	0.05	161.45	199.50	215.71	224.58	230.16	233.99	2.36.77	238.88	240.54	241.88	242.98	243.90	244.69	245.36	245.95	248.02	249.26	250.10	251.14	251.77	252.20	252.72	253.04
	0.01	4052	4999	5404	5624	5764	5859	5928	5981	6022	6056	6083	6107	6126	6143	6157	6209	6240	6260	6286	6302	6313	6326	6334
	0.005	16212	19997	21614	22501	23056	23440	23715	23924	24091	24222	24334	24427	24505	24572	24632	24837	24959	25041	25146	25213	25254	25306	25339
2	0.05	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.40	19.41	19.42	19.42	19.43	19.45	19.46	19.46	19.47	19.48	19.48	19.48	19.49
	0.01	98.50	99.00	99.16	99.25	99.30	99.33	99.36	99.38	99.39	99.40	99.41	99.42	99.42	99.43	99.43	99.45	99.46	99.47	99.48	99.48	99.48	99.48	99.49
	0.005	198.50	199.01	199.16	199.24	199.30	199.33	199.36	199.38	199.39	199.39	199.42	199.42	199.42	199.42	199.43	199.45	199.45	199.48	199.48	199.48	199.48	199.48	199.48
3	0.05	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.76	8.74	8.73	8.71	8.70	8.66	8.63	8.62	8.59	8.58	8.57	8.56	8.55
	0.01	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.34	27.23	27.13	27.05	26.98	26.92	26.87	26.69	26.58	26.50	26.41	26.35	26.32	26.27	26.24
	0.005	55.55	49.80	47.47	46.20	45.39	44.84	44.43	44.13	43.88	43.68	43.52	43.39	43.27	43.17	43.08	42.78	42.59	42.47	42.31	42.21	42.15	42.07	42.02
4	0.05	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.94	5.91	5.89	5.87	5.86	5.80	5.77	5.75	5.72	5.70	5.69	5.67	5.66
	0.01	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55	14.45	14.37	14.31	14.25	14.20	14.02	13.91	13.84	13.75	13.69	13.65	13.61	13.58
	0.005	31.33	26.28	24.26	23.15	22.46	21.98	21.62	21.35	21.14	20.97	20.82	20.70	20.60	20.51	20.44	20.17	20.00	19.89	19.75	19.67	19.61	19.54	19.50
5	0.05	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.70	4.68	4.66	4.64	4.62	4.56	4.52	4.50	4.46	4.44	4.43	4.41	4.41
	0.01	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	9.96	9.89	9.82	9.77	9.72	9.55	9.45	9.38	9.29	9.24	9.20	9.16	9.13
	0.005	22.78	18.31	16.53	15.56	14.94	14.51	14.20	13.96	13.77	13.62	13.49	1.3.38	13.29	13.21	13.15	12.90	12.76	12.66	12.53	12.45	12.40	12.34	12.30
6	0.05	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.03	4.00	3.98	3.96	3.94	3.87	3.83	3.81	3.77	3.75	3.74	3.72	3.71
	0.01	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.79	7.72	7.66	7.60	7.56	7.40	7.30	7.23	7.14	7.09	7.06	7.01	6.99
	0.005	18.63	14.54	12.92	12.03	11.46	11.07	10.79	10.57	10.39	10.25	10.13	10.03	9.95	9.88	9.81	9.59	9.45	9.36	9.24	9.17	9.12	9.06	9.03
7	0.05	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.60	3.57	3.55	3.53	3.51	3.44	3.40	3.38	3.34	3.32	3.30	3.29	3.27
	0.01	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.54	6.47	6.41	6.36	6.31	6.16	6.06	5.99	5.91	5.86	5.82	5.78	5.75
	0.005	16.24	12.40	10.88	10.05	9.52	9.16	8.89	8.68	8.51	8.38	8.27	8.18	8.10	8.03	7.97	7.75	7.62	7.53	7.42	7.35	7.31	7.25	7.22
8	0.05	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.31	3.28	3.26	3.24	3.22	3.15	3.11	3.08	3.04	3.02	3.01	2.99	2.97
	0.01	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.73	5.67	5.61	5.56	5.52	5.36	5.26	5.20	5.12	5.07	5.03	4.99	4.96
	0.005	14.69	11.04	9.60	8.81	8.30	7.95	7.69	7.50	7.34	7.21	7.10	7.01	6.94	6.87	6.81	6.61	6.48	6.40	6.29	6.22	6.18	6.12	6.09
9	0.05	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.10	3.07	3.05	3.03	3.01	2.94	2.89	2.86	2.83	2.80	2.79	2.77	2.76
	0.01	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.18	5.11	5.05	5.01	4.96	4.81	4.71	4.65	4.57	4.52	4.48	4.44	4.41
	0.005	13.61	10.11	8.72	7.96	7.47	7.13	6.88	6.69	6.54	6.42	6.31	6.23	6.15	6.09	6.03	5.83	5.71	5.62	5.52	5.45	5.41	5.36	5.32
10	0.05	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.94	2.91	2.89	2.86	2.85	2.77	2.73	2.70	2.66	2.64	2.62	2.60	2.59

	0.01	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.77	4.71	4.65	4.60	4.56	4.41	4.31	4.25	4.17	4.12	4.08	4.04	4.01
	0.005	12.83	9.43	8.08	7.34	6.87	6.54	6.30	6.12	5.97	5.85	5.75	5.66	5.59	5.53	5.47	5.27	5.15	5.07	4.97	4.90	4.86	4.80	4.77
11	0.05	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.82	2.79	2.76	2.74	2.72	2.65	2.60	2.57	2.53	2.51	2.49	2.47	2.46
	0.01	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.46	4.40	4.34	4.29	4.25	4.10	4.01	3.94	3.86	3.81	3.78	3.73	3.71
	0.005	12.23	8.91	7.60	6.88	6.42	6.10	5.86	5.68	5.54	5.42	5.32	5.24	5.16	5.10	5.05	4.86	4.74	4.65	4.55	4.49	4.45	4.39	4.36
12	0.05	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.72	2.69	2.66	2.64	2.62	2.54	2.50	2.47	2.43	2.40	2.38	2.36	2.35
	0.01	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.22	4.16	4.10	4.05	4.01	3.86	3.76	3.70	3.62	3.57	3.54	3.49	3.47
	0.005	11.75	8.51	7.23	6.52	6.07	5.76	5.52	5.35	5.20	5.09	4.99	4.91	4.84	4.77	4.72	4.53	4.41	4.33	4.23	4.17	4.12	4.07	4.04
13	0.05	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.63	2.60	2.58	2.55	2.53	2.46	2.41	2.38	2.34	2.31	2.30	2.27	2.26
	0.01	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	4.02	3.96	3.91	3.86	3.82	3.66	3.57	3.51	3.43	3.38	3.34	3.30	3.27
	0.005	11.37	8.19	6.93	6.23	5.79	5.48	5.25	5.08	4.94	4.82	4.72	4.64	4.57	4.51	4.46	4.27	4.15	4.07	3.97	3.91	3.87	3.81	3.78
14	0.05	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.57	2.53	2.51	2.48	2.46	2.39	2.34	2.31	2.27	2.24	2.22	2.20	2.19
	0.01	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.86	3.80	3.75	3.70	3.66	3.51	3.41	3.35	3.27	3.22	3.18	3.14	3.11
	0.005	11.06	7.92	6.68	6.00	5.56	5.26	5.03	4.86	4.72	4.60	4.51	4.43	4.36	4.30	4.25	4.06	3.94	3.86	3.76	3.70	3.66	3.60	3.57
15	0.05	4.54	3.68	3.29	3.06	2.9	2.79	2.71	2.64	2.59	2.54	2.51	2.48	2.45	2.42	2.40	2.33	2.28	2.25	2.20	2.18	2.16	2.14	2.12
	0.01	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.73	3.67	3.61	3.56	3.52	3.37	3.28	3.21	3.13	3.08	3.05	3.00	2.98
	0.005	10.80	7.70	6.48	5.80	5.37	5.07	4.85	4.67	4.54	4.42	4.33	4.25	4.18	4.12	4.07	3.88	3.77	3.69	3.59	3.52	3.48	3.43	3.39
16	0.05	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.46	2.42	2.40	2.37	2.35	2.28	2.23	2.19	2.15	2.12	2.11	2.08	2.07
	0.01	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.62	3.55	3.50	3.45	3.41	3.26	3.16	3.10	3.02	2.97	2.93	2.89	2.86
	0.005	10.58	7.51	6.30	5.64	5.21	4.91	4.69	4.52	4.38	4.27	4.18	4.10	4.03	3.97	3.92	3.73	3.62	3.54	3.44	3.37	3.33	3.28	3.25
17	0.05	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.41	2.38	2.35	2.33	2.31	2.23	2.18	2.15	2.10	2.08	2.06	2.03	2.02
	0.01	9.40	6.11	5.19	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.52	3.46	3.40	3.35	3.31	3.16	3.07	3.00	2.92	2.87	2.83	2.79	2.76
	0.005	10.38	7.35	6.16	5.50	5.07	4.78	4.56	4.39	4.25	4.14	4.05	3.97	3.90	3.84	3.79	3.61	3.49	3.41	3.31	3.25	3.21	3.15	3.12
18	0.05	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.37	2.34	2.31	2.29	2.27	2.19	2.14	2.11	2.06	2.04	2.02	1.99	1.98
	0.01	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.74	3.60	3.51	3.43	3.37	3.32	3.27	3.23	3.08	2.98	2.92	2.84	2.78	2.75	2.70	2.68
	0.005	10.22	7.21	6.03	5.37	4.96	4.66	4.44	4.28	4.14	4.03	3.94	3.86	3.79	3.73	3.68	3.50	3.38	3.30	3.20	3.14	3.10	3.04	3.01
19	0.05	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.34	2.31	2.28	2.26	2.23	2.16	2.11	2.07	2.03	2.00	1.98	1.96	1.94
	0.01	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.36	3.30	3.24	3.19	3.15	3.00	2.91	2.84	2.76	2.71	2.67	2.63	2.60
	0.005	10.07	7.09	5.92	4.27	4.85	4.56	4.34	4.18	4.04	3.93	3.84	3.76	3.70	3.64	3.59	3.40	3.29	3.21	3.11	3.04	3.00	2.95	2.91
20	0.05	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.31	2.28	2.25	2.22	2.20	2.12	2.07	2.04	1.99	1.97	1.95	1.92	1.91
	0.01	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.29	3.23	3.18	3.13	3.09	2.94	2.84	2.78	2.69	2.64	2.61	2.56	2.54
	0.005	9.94	6.99	5.82	5.17	4.76	4.47	4.26	4.09	3.96	3.85	3.76	3.68	3.61	3.55	3.50	3.32	3.20	3.12	3.02	2.96	2.92	2.86	2.83
21	0.05	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.28	2.25	2.22	2.20	2.18	2.10	2.05	2.01	1.96	1.94	1.92	1.89	1.88
	0.01	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40	3.31	3.24	3.17	3.12	3.07	3.03	2.88	2.79	2.72	2.64	2.58	2.55	2.50	2.48
	0.005	9.83	6.89	5.73	5.09	4.68	4.39	4.18	4.01	3.88	3.77	3.68	3.60	3.54	3.48	3.43	3.24	3.13	3.05	2.95	2.88	2.84	2.79	2.75
22	0.05	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.26	2.23	2.20	2.17	2.15	2.07	2.02	1.98	1.94	1.91	1.89	1.86	1.85
	0.01	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	3.18	3.12	3.07	3.02	2.98	2.83	2.73	2.67	2.58	2.53	2.50	2.45	2.42

	0.005	9.73	6.81	5.65	5.02	4.61	4.32	4.11	3.94	3.81	3.70	3.61	3.54	3.47	3.41	3.36	3.18	3.06	2.98	2.88	2.82	2.77	2.72	2.69
23	0.05	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.24	2.20	2.18	2.15	2.13	2.05	2.00	1.96	1.91	1.88	1.86	1.84	1.82
	0.01	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30	3.21	3.14	3.07	3.02	2.97	2.93	2.78	2.69	2.62	2.54	2.48	2.45	2.40	2.37
	0.005	9.63	6.73	5.58	4.95	4.54	4.26	4.05	3.88	3.75	3.64	3.55	3.47	3.41	3.35	3.30	3.12	3.00	2.92	2.82	2.76	2.71	2.66	2.62
24	0.05	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.22	2.18	2.15	2.13	2.11	2.03	1.97	1.94	1.89	1.86	1.84	1.82	1.80
	0.01	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	3.09	3.03	2.98	2.93	2.89	2.74	2.64	2.58	2.49	2.44	2.40	2.36	2.33
	0.005	9.55	6.66	5.52	4.89	4.49	4.20	3.99	3.83	3.69	3.59	3.50	3.42	3.35	3.30	3.25	3.06	2.95	2.87	2.77	2.70	2.66	2.60	2.57
25	0.05	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.20	2.16	2.14	2.11	2.09	2.01	1.96	1.92	1.87	1.84	1.82	1.80	1.78
	0.01	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13	3.06	2.99	2.94	2.89	2.85	2.70	2.60	2.54	2.45	2.40	2.36	2.32	2.29
	0.005	9.48	6.60	5.46	4.84	4.43	4.15	3.94	3.78	3.64	3.54	3.45	3.37	3.30	3.25	3.20	3.01	2.90	2.82	2.72	2.65	2.61	2.55	2.52
26	0.05	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.18	2.15	2.12	2.09	2.07	1.99	1.94	1.90	1.85	1.82	1.80	1.78	1.76
	0.01	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18	3.09	3.02	2.96	2.90	2.86	2.81	2.66	2.57	2.50	2.42	2.36	2.33	2.28	2.25
	0.005	9.41	6.54	5.41	4.79	4.38	4.10	3.89	3.73	3.60	3.49	3.40	3.33	3.26	3.20	3.15	2.97	2.85	2.77	2.67	2.61	2.56	2.51	2.47
27	0.05	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.17	1.13	2.10	2.08	2.06	1.97	1.92	1.88	1.84	1.81	1.79	1.76	1.74
	0.01	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26	3.15	3.06	2.99	2.93	2.87	2.82	2.78	2.63	2.54	2.47	2.38	2.33	2.29	2.25	2.22
	0.005	9.34	6.49	5.36	4.74	4.34	4.06	3.85	3.69	3.56	3.45	3.36	3.28	3.22	3.16	3.11	2.93	2.81	2.73	2.63	2.57	2.52	2.47	2.43
28	0.05	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.15	2.12	2.09	2.06	2.04	1.96	1.91	1.87	1.82	1.79	1.77	1.74	1.73
	0.01	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12	3.03	2.96	2.90	2.84	2.79	2.75	2.60	2.51	2.44	2.35	2.30	2.26	2.22	2.19
	0.005	9.28	6.44	5.32	4.70	4.30	4.02	3.81	3.65	3.52	3.41	3.32	3.25	3.18	3.12	3.07	2.89	2.77	2.69	2.59	2.53	2.48	2.43	2.39
29	0.05	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.14	2.10	2.08	2.05	2.03	1.94	1.89	1.85	1.81	1.77	1.75	1.73	1.71
	0.01	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20	3.09	3.00	2.93	2.87	2.81	2.77	2.73	2.57	2.48	2.41	2.33	2.27	2.23	2.19	2.16
	0.005	9.23	6.40	5.28	4.66	4.26	3.98	3.77	3.61	3.48	3.38	3.29	3.21	3.15	3.09	3.04	2.86	2.74	2.66	2.56	2.49	2.45	2.39	2.36
30	0.05	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.13	2.09	2.06	2.04	2.01	1.93	1.88	1.84	1.79	1.76	1.74	1.71	1.70
	0.01	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.91	2.84	2.79	2.74	2.70	2.55	2.45	2.39	2.30	2.25	2.21	2.16	2.13
	0.005	9.18	6.35	5.24	4.62	4.23	3.95	3.74	3.58	3.45	3.34	3.25	3.18	3.11	3.06	3.01	2.82	2.71	2.63	2.52	2.46	2.42	2.36	2.32
32	0.05	4.15	3.29	2.90	2.67	2.51	2.40	2.31	2.24	2.19	2.14	2.10	2.07	2.04	2.01	1.99	.91	1.85	1.82	1.77	1.74	1.71	1.69	1.67
	0.01	7.50	5.34	4.46	3.97	3.65	3.43	3.26	3.13	3.02	2.93	2.86	2.80	2.74	2.70	2.65	.50	2.41	2.34	2.25	2.20	2.16	2.11	2.08
	0.005	9.09	6.28	5.17	4.56	4.17	3.89	3.68	3.52	3.39	3.29	3.20	3.12	3.06	3.00	2.95	.77	2.65	2.57	2.47	2.40	2.36	2.30	2.26
34	0.05	4.13	3.28	2.88	2.65	2.49	2.38	2.29	2.23	2.17	2.12	2.08	2.05	2.02	1.99	1.97	.89	1.83	1.80	1.75	1.71	1.69	1.66	1.65
	0.01	7.44	5.29	4.42	3.93	3.61	3.39	3.22	3.09	2.98	2.89	2.82	2.76	2.70	2.66	2.61	.46	2.37	2.30	2.21	2.16	2.12	2.07	2.04
	0.005	9.01	6.22	5.11	4.50	4.11	3.84	3.63	3.47	3.34	3.24	3.15	3.07	3.01	2.95	2.90	.72	2.60	2.52	2.42	2.35	2.30	2.25	2.21
36	0.05	4.11	3.26	2.87	2.63	2.48	2.36	2.28	2.21	2.15	2.11	2.07	2.03	2.00	1.98	1.95	.87	1.81	1.78	1.73	1.69	1.67	1.64	1.62
	0.01	7.40	5.25	4.38	3.89	3.57	3.35	3.18	3.05	2.95	2.86	2.79	2.72	2.67	2.62	2.58	.43	2.33	2.26	2.18	2.12	2.08	2.03	2.00
	0.005	8.94	6.16	5.06	4.46	4.06	3.79	3.58	3.42	3.30	3.19	3.10	3.03	2.96	2.90	2.85	.67	2.56	2.48	2.37	2.30	2.26	2.20	2.17
38	0.05	4.10	3.24	2.85	2.62	2.46	2.35	2.26	2.19	2.14	2.09	2.05	2.02	1.99	1.96	1.94	.85	1.80	1.76	1.71	1.68	1.65	1.62	1.61
	0.01	7.35	5.21	4.34	3.86	3.54	3.32	3.15	3.02	2.92	2.83	2.75	2.69	2.64	2.59	2.55	.40	2.30	2.23	2.14	2.09	2.05	2.00	1.97
	0.005	8.88	6.11	5.02	4.41	4.02	3.75	3.54	3.39	3.26	3.15	3.06	2.99	2.92	2.87	2.82	.63	2.52	2.44	2.33	2.27	2.22	2.16	2.12

40	0.05	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.04	2.00	1.97	1.95	1.92	.84	1.78	1.74	1.69	1.66	1.64	1.61	1.59
	0.01	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.73	2.66	2.61	2.56	2.52	.37	2.27	2.20	2.11	2.06	2.02	1.97	1.94
	0.005	8.83	6.07	4.98	4.37	3.99	3.71	3.51	3.35	3.22	3.12	3.03	2.95	2.89	2.83	2.78	.60	2.48	2.40	2.30	2.23	2.18	2.12	2.09
42	0.05	4.07	3.22	2.83	2.59	2.44	2.32	2.24	2.17	2.11	2.06	2.03	1.99	1.96	1.94	1.91	.83	1.77	1.73	1.68	1.65	1.62	1.59	1.57
	0.01	7.28	5.15	4.29	3.80	3.49	3.27	3.10	2.97	2.86	2.78	2.70	2.64	2.59	2.54	2.50	.34	2.25	2.18	2.09	2.03	1.99	1.94	1.91
	0.005	8.78	6.03	4.94	4.34	3.95	3.68	3.48	3.32	3.19	3.09	3.00	2.92	2.86	2.80	2.75	.57	2.45	2.37	2.26	2.20	2.15	2.09	2.06
44	0.05	4.06	3.21	2.82	2.58	2.43	2.31	2.23	2.16	2.10	2.05	2.01	1.98	1.95	1.92	1.90	.81	1.76	1.72	1.67	1.63	1.61	1.58	1.56
	0.01	7.25	5.12	4.26	3.78	3.47	3.24	3.08	2.95	2.84	2.75	2.68	2.62	2.56	2.52	2.47	.32	2.22	2.15	2.07	2.01	1.97	1.92	1.89
	0.005	8.74	5.99	4.91	4.31	3.92	3.65	3.45	3.29	3.16	3.06	2.97	2.89	2.83	2.77	2.72	.54	2.42	2.34	2.24	2.17	2.12	2.06	2.03
46	0.05	4.05	3.20	2.81	2.57	2.42	2.30	2.22	2.15	2.09	2.04	2.00	1.97	1.94	1.91	1.89	.80	1.75	1.71	1.65	1.62	1.60	1.57	1.55
	0.01	7.22	5.10	4.24	3.76	3.44	3.22	3.06	2.93	2.82	2.73	2.66	2.60	2.54	2.50	2.45	.30	2.20	2.13	2.04	1.99	1.95	1.90	1.86
	0.005	8.70	5.96	4.88	4.28	3.90	3.62	3.42	3.26	3.14	3.03	2.94	2.87	2.80	2.75	2.70	.51	2.40	2.32	2.21	2.14	2.10	2.04	2.00
48	0.05	4.04	3.19	2.80	2.57	2.41	2.29	2.21	2.14	2.08	2.03	1.99	1.96	1.93	1.90	1.88	.79	1.74	1.70	1.64	1.61	1.59	1.56	1.54
	0.01	7.19	5.08	4.22	3.74	3.43	3.20	3.04	2.91	2.80	2.71	2.64	2.28	2.53	2.48	2.44	.28	2.18	2.12	2.02	1.97	1.93	1.88	1.84
	0.005	8.66	5.93	4.85	4.25	3.87	3.60	3.40	3.24	3.11	3.01	2.92	2.85	1.78	2.72	2.67	.49	2.37	2.29	2.19	2.12	2.07	2.01	1.97
50	0.05	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.99	1.95	1.92	1.89	1.87	.78	1.73	1.69	1.63	1.60	1.58	1.54	1.52
	0.01	7.17	5.06	4.20	3.72	3.41	3.19	3.02	2.89	2.78	2.70	2.63	2.56	2.51	2.46	2.42	.27	2.17	2.10	2.01	1.95	1.91	1.86	1.82
	0.005	8.63	5.90	4.83	4.23	3.85	3.58	3.38	3.22	3.09	2.99	2.90	2.82	2.76	2.70	2.65	.47	2.35	2.27	2.16	2.10	2.05	1.99	1.95
55	0.05	4.02	3.16	2.77	2.54	2.38	2.27	2.18	2.11	2.06	2.01	1.97	1.93	1.90	1.88	85	1.76	1.71	1.67	1.61	1.58	1.55	1.52	1.50
	0.01	7.12	5.01	4.16	3.68	3.37	3.15	2.98	2.85	2.75	2.66	2.59	2.53	2.47	2.42	38	2.23	2.13	2.06	1.97	1.91	1.87	1.82	1.78
	0.005	8.55	5.84	4.77	4.18	3.80	3.53	3.33	3.17	3.05	2.94	2.85	2.78	2.71	2.66	61	2.42	2.31	2.23	2.12	2.05	2.00	1.94	1.90
60	0.05	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.95	1.92	1.89	1.86	84	1.75	1.69	1.65	1.59	1.56	1.53	1.50	1.48
	0.01	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.56	2.50	2.44	2.39	35	2.20	2.10	2.03	1.94	1.88	1.84	1.78	1.75
	0.005	8.49	5.79	4.73	4.14	3.76	3.49	3.29	3.13	3.01	2.90	2.82	2.74	2.68	2.62	57	2.39	2.27	2.19	2.08	2.01	1.96	1.90	1.86
65	0.05	3.99	3.14	2.75	2.51	2.36	2.24	2.15	2.08	2.03	1.98	1.94	1.90	1.87	1.85	82	1.73	1.68	1.63	1.58	1.54	1.52	1.49	1.46
	0.01	7.04	4.95	4.10	3.62	3.31	3.09	2.93	2.80	2.69	2.61	2.53	2.47	2.42	2.37	33	2.17	2.07	2.00	1.91	1.85	1.81	1.75	1.72
	0.005	8.44	5.75	4.69	4.11	3.73	3.46	3.26	3.10	2.98	2.87	2.79	2.71	2.65	2.59	54	2.36	2.24	2.16	2.05	1.98	1.93	1.87	1.83
70	0.05	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97	1.93	1.89	1.86	1.84	81	1.72	1.66	1.62	1.57	1.53	1.50	1.47	1.45
	0.01	7.01	4.92	4.07	3.60	3.29	3.07	2.91	2.78	2.67	2.59	2.51	2.45	2.40	2.35	31	2.15	2.05	1.98	1.89	1.83	1.78	1.73	1.70
	0.005	8.40	5.72	4.66	4.08	3.70	3.43	3.23	3.08	2.95	2.85	2.76	2.68	2.62	2.56	51	2.33	2.21	2.13	2.02	1.95	1.90	1.84	1.80
80	0.05	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.91	1.88	1.84	1.82	79	1.70	1.64	1.60	1.54	1.51	1.48	1.45	1.43
	0.01	6.96	4.88	4.04	3.56	3.26	3.04	2.87	2.74	2.64	2.55	2.48	2.42	2.36	2.31	27	2.12	2.01	1.94	1.85	1.79	1.75	1.69	1.65
	0.005	8.33	5.67	4.61	4.03	3.65	3.39	3.19	3.03	2.91	2.80	2.72	2.64	2.58	2.52	47	2.29	2.17	2.08	1.97	1.90	1.85	1.79	1.75
90	0.05	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94	1.90	1.86	1.83	1.80	78	1.69	1.63	1.59	1.53	1.49	1.46	1.43	1.41
	0.01	6.93	4.85	4.01	3.53	3.23	3.01	2.84	2.72	2.61	2.52	2.45	2.39	2.33	2.29	24	2.09	1.99	1.92	1.82	1.76	1.72	1.66	1.62
	0.005	8.28	5.62	4.57	3.99	3.62	3.35	3.15	3.00	2.87	2.77	2.68	2.61	2.54	2.49	44	2.25	2.13	2.05	1.94	1.87	1.82	1.75	1.71
100	0.05	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.89	1.85	1.82	1.79	77	1.68	1.62	1.57	1.52	1.48	1.45	1.41	1.39

	0.01	6.90	4.82	3.98	3.51	3.21	2.99	2.82	2.69	2.59	2.50	2.43	2.37	2.31	2.27	22	2.07	1.97	1.89	1.80	1.74	1.69	1.63	1.60
	0.005	8.24	5.59	4.54	3.96	3.59	3.33	3.13	2.97	2.85	2.74	2.66	2.58	2.52	2.46	41	2.23	2.11	2.02	1.91	1.84	1.79	1.72	1.68
120	0.05	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.87	1.83	1.80	1.78	75	1.66	1.60	1.55	1.50	1.46	1.43	1.39	1.37
	0.01	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.40	2.34	2.28	2.23	19	2.03	1.93	1.86	1.76	1.70	1.66	1.60	1.56
	0.005	8.18	5.54	4.50	3.92	3.55	3.28	3.09	2.93	2.81	2.71	2.62	2.54	2.48	2.42	37	2.19	2.07	1.98	1.87	1.80	1.75	1.68	1.64
160	0.05	3.90	3.05	2.66	2.43	2.27	2.16	2.07	2.00	1.94	1.89	1.85	1.81	1.78	1.75	73	1.64	1.57	1.53	1.47	1.43	1.40	1.36	1.34
	0.01	6.80	4.74	3.91	3.44	3.13	2.92	2.75	2.62	2.52	2.43	2.36	2.30	2.24	2.20	15	1.99	1.89	1.82	1.72	1.66	1.61	1.55	1.51
	0.005	8.10	5.48	4.44	3.87	3.50	3.24	3.04	2.88	2.76	2.66	2.57	2.50	2.43	2.38	33	2.14	2.02	1.93	1.82	1.75	1.69	1.62	1.58
200	0.05	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98	1.93	1.88	1.84	1.80	1.77	1.74	72	1.62	1.56	1.52	1.46	1.41	1.39	1.35	1.32
	0.01	6.76	4.71	3.88	3.41	3.11	2.89	2.73	2.60	2.50	2.41	2.34	2.27	2.22	2.17	13	1.97	1.87	1.79	1.69	1.63	1.58	1.52	1.48
	0.005	8.06	5.44	4.41	3.84	3.47	3.21	3.01	2.86	2.73	2.63	2.54	2.47	2.40	2.35	30	2.11	1.99	1.91	1.79	1.71	1.66	1.59	1.54
400	0.05	3.86	3.02	2.63	2.39	2.24	2.12	2.03	1.96	1.90	1.85	1.81	1.78	1.74	1.72	1.69	1.60	1.53	1.49	1.42	1.38	1.35	1.31	1.28
	0.01	6.70	4.66	3.83	3.37	3.06	2.85	2.68	2.56	2.45	2.37	2.29	2.23	2.17	2.13	2.08	1.92	1.82	1.75	1.64	1.58	1.53	1.46	1.42
	0.005	7.97	5.37	4.34	3.78	3.41	3.15	2.95	2.80	2.68	2.57	2.49	2.41	2.35	2.29	2.24	2.06	1.93	1.85	1.73	1.65	1.60	1.52	1.47
∞	0.05	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.79	1.75	1.72	1.69	1.67	1.57	1.51	1.46	1.39	1.35	1.32	1.27	1.24
	0.01	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.25	2.18	2.13	2.08	2.04	1.88	1.77	1.70	1.59	1.52	1.47	1.40	1.36
	0.005	7.88	5.30	4.28	3.72	3.35	3.09	2.90	2.74	2.62	2.52	2.43	2.36	2.29	2.24	2.19	2.00	1.88	1.79	1.67	1.59	1.53	1.45	1.40

5 Critical values of the χ^2-distribution

Table 5 provides critical values of the χ^2-distribution to be used in conjunction with calculation of a χ-value. To use the table, follow the steps below:

1 Look for the row with the appropriate number of degrees of freedom (*df*).

2 Look across the columns until you find the largest value of χ^2 in that row which is smaller than the value obtained from calculation. The value at the very top of that column is the *p*-value that you should report.

Note: The columns in the table represent the most commonly used alpha levels.

For example, if the calculated χ^2 is 16.41, with 7 degrees of freedom, then to find the *p*-value go to the row with $df = 7$ and look along this to find the largest value that 16.41 exceeds. In this case the value is 14.0671 and this corresponds to a *p*-value of .05. Full results of this χ^2-test could then be reported as $\chi^2(7) = 16.41$, $p < .05$.

The relevant lines in the table are reproduced below, with relevant numbers in boxes:

df	Area beyond χ^2									
	0.99	0.95	0.9	0.8	0.2	0.1	0.05	0.01	0.005	0.001
7	1.2390	2.1673	2.8331	3.8223	9.8032	12.0170	14.0671	18.4753	20.2777	24.3213

Table 5 Critical values of the χ^2-distribution (Smithson, 2000, pp. 430–431)

df	Area beyond χ^2									
	0.99	0.95	0.9	0.8	0.2	0.1	0.05	0.01	0.005	0.001
1	0.0002	0.0039	0.0158	0.0642	1.6424	2.7055	3.8415	6.6349	7.8794	10.8274
2	0.0201	0.1026	0.2107	0.4463	3.2189	4.6052	5.9915	9.2104	10.5965	13.8150
3	0.1148	0.3518	0.5844	1.0052	4.6416	6.2514	7.8147	11.3449	12.8381	16.2260
4	0.2971	0.7107	1.0636	1.6488	5.9886	7.7794	9.4877	13.2767	14.8602	18.4662
5	0.5543	1.1455	1.6103	2.3425	7.2893	9.2363	11.0705	15.0863	16.7496	20.5147
6	0.8721	1.6354	2.2041	3.0701	8.5581	10.6446	12.5916	16.8119	18.5475	22.4575
7	1.2390	2.1673	2.8331	3.8223	9.8032	12.0170	14.0671	18.4753	20.2777	24.3213
8	1.6465	2.7326	3.4895	4.5936	11.0301	13.3616	15.5073	20.0902	21.9549	26.1239
9	2.0879	3.3251	4.1682	5.3801	12.2421	14.6837	16.9190	21.6660	23.5893	27.8767
10	2.5582	3.9403	4.8652	6.1791	13.4420	15.9872	18.3070	23.2093	25.1881	29.5879
11	3.0535	4.5748	5.5778	6.9887	14.6314	17.2750	19.6752	24.7250	26.7569	31.2635
12	3.5706	5.2260	6.3038	7.8073	15.8120	18.5493	21.0261	26.2170	28.2997	32.9092
13	4.1069	5.8919	7.0415	8.6339	16.9848	19.8119	22.3620	27.6882	29.8193	34.5274
14	4.6604	6.5706	7.7895	9.4673	18.1508	21.0641	23.6848	29.1412	31.3194	36.1239
15	5.2294	7.2609	8.5468	10.3070	19.3107	22.3071	24.9958	30.5780	32.8015	37.6978
16	5.8122	7.9616	9.3122	11.1521	20.4651	23.5418	26.2962	31.9999	34.2671	39.2518
17	6.4077	8.6718	10.0852	12.0023	21.6146	24.7690	27.5871	33.4087	35.7184	40.7911
18	7.0149	9.3904	10.8649	12.8570	22.7595	25.9894	28.8693	34.8052	37.1564	42.3119
19	7.6327	10.1170	11.6509	13.7158	23.9004	27.2036	30.1435	36.1908	38.5821	43.8194
20	8.2604	10.8508	12.4426	14.5784	25.0375	28.4120	31.4104	37.5663	39.9969	45.3142
21	8.8972	11.5913	13.2396	15.4446	26.1711	29.6151	32.6706	38.9322	41.4009	46.7963

22	9.5425	12.3380	14.0415	16.3140	27.3015	30.8133	33.9245	40.2894	42.7957	48.2676
23	10.1957	13.0905	14.8480	17.1865	28.4288	32.0069	35.1725	41.6383	44.1814	49.7276
24	10.8563	13.8484	15.6587	18.0618	29.5533	33.1962	36.4150	42.9798	45.5584	51.1790
25	11.5240	14.6114	16.4734	18.9397	30.6752	34.3816	37.6525	44.3140	46.9280	52.6187
26	12.1982	15.3792	17.2919	19.8202	31.7946	35.5632	38.8851	45.6416	48.2898	54.0511
27	12.8785	16.1514	18.1139	20.7030	32.9117	36.7412	40.1133	46.9628	49.6450	55.4751
28	13.5647	16.9279	18.9392	21.5880	34.0266	37.9159	41.3372	48.2782	50.9936	56.8918
29	14.2564	17.7084	19.7677	22.4751	35.1394	39.0875	42.5569	49.5878	52.3355	58.3006
30	14.9535	18.4927	20.5992	23.3641	36.2502	40.2560	43.7730	50.8922	53.6719	59.7022
31	15.6555	19.2806	21.4336	24.2551	37.3591	41.4217	44.9853	52.1914	55.0025	61.0980
32	16.3622	20.0719	22.2706	25.1478	38.4663	42.5847	46.1942	53.4857	56.3280	62.4873
33	17.0735	20.8665	23.1102	26.0422	39.5718	43.7452	47.3999	54.7754	57.6483	63.8694
34	17.7891	21.6643	23.9522	26.9383	40.6756	44.9032	48.6024	56.0609	58.9637	65.2471
35	18.5089	22.4650	24.7966	27.8359	41.7780	46.0588	49.8018	57.3420	60.2746	66.6192
36	19.2326	23.2686	25.6433	28.7350	42.8788	47.2122	50.9985	58.6192	61.5811	67.9850
37	19.9603	24.0749	26.4921	29.6355	43.9782	48.3634	52.1923	59.8926	62.8832	69.3476
38	20.6914	24.8839	27.3430	30.5373	45.0763	49.5126	53.3835	61.1620	64.1812	70.7039
39	21.4261	25.6954	28.1958	31.4405	46.1730	50.6598	54.5722	62.4281	65.4753	72.0550
40	22.1642	26.5093	29.0505	32.3449	47.2685	51.8050	55.7585	63.6908	66.7660	73.4029
41	22.9056	27.3256	29.9071	33.2506	48.3628	52.9485	56.9424	64.9500	68.0526	74.7441
42	23.6501	28.1440	30.7654	34.1574	49.4560	54.0902	58.1240	66.2063	69.3360	76.0842
43	24.3976	28.9647	31.6255	35.0653	50.5480	55.2302	59.3035	67.4593	70.6157	77.4184
44	25.1480	29.7875	32.4871	35.9744	51.6389	56.3685	60.4809	68.7096	71.8923	78.7487
45	25.9012	30.6123	33.3504	36.8844	52.7288	57.5053	61.6562	69.9569	73.1660	80.0776
46	26.6572	31.4390	34.2152	37.7955	53.8177	58.6405	62.8296	71.2015	74.4367	81.3998
47	27.4158	32.2676	35.0814	38.7075	54.9056	69.7743	64.0011	72.4432	75.7039	82.7198
48	28.1770	33.0981	35.9491	39.6205	55.9926	60.9066	65.1708	73.6826	76.9689	84.0368
49	28.9406	33.9303	36.8182	40.5344	57.0786	62.0375	66.3387	74.9194	78.2306	85.3499
50	29.7067	34.7642	37.6886	41.4492	58.1638	63.1671	67.5048	76.1538	79.4898	86.6603