

## 12.2 Distribution tables

- Table A1. Uniform random numbers, p. 411  
 Table A2. Binomial distribution, p. 412  
 Table A3. Poisson distribution, p. 415  
 Table A4. Standard Normal distribution, p. 417  
 Table A5. Student's T-distribution, p. 419  
 Table A6. Chi-square ( $\chi^2$ )-distribution, p. 420  
 Table A7. F-distribution, p. 421  
 Table A8. Critical values for the Wilcoxon test statistic, p. 425  
 Table A9. Critical values for the Mann-Whitney-Wilcoxon test statistic, p. 426

**Table A1. Table of Uniform(0,1) random numbers**

$z$	1	2	3	4	5	6	7	8	9	10
1	.9501	.8381	.7948	.4154	.6085	.4398	.2974	.7165	.7327	.8121
2	.2311	.0196	.9568	.3050	.0158	.3400	.0492	.5113	.4222	.6101
3	.6068	.6813	.5226	.8744	.0164	.3142	.6932	.7764	.9614	.7015
4	.4860	.3795	.8801	.0150	.1901	.3651	.6501	.4893	.0721	.0922
5	.8913	.8318	.1730	.7680	.5869	.3932	.9830	.1859	.5534	.4249
6	.7621	.5028	.9797	.9708	.0576	.5915	.5527	.7006	.2920	.3756
7	.4565	.7095	.2714	.9901	.3676	.1197	.4001	.9827	.8580	.1662
8	.0185	.4289	.2523	.7889	.6315	.0381	.1988	.8066	.3358	.8332
9	.8214	.3046	.8757	.4387	.7176	.4586	.6252	.7036	.6802	.8386
10	.4447	.1897	.7373	.4983	.6927	.8699	.7334	.4850	.0534	.4516
11	.6154	.1934	.1365	.2140	.0841	.9342	.3759	.1146	.3567	.9566
12	.7919	.6822	.0118	.6435	.4544	.2644	.0099	.6649	.4983	.1472
13	.9218	.3028	.8939	.3200	.4418	.1603	.4199	.3654	.4344	.8699
14	.7382	.5417	.1991	.9601	.3533	.8729	.7537	.1400	.5625	.7694
15	.1763	.1509	.2987	.7266	.1536	.2379	.7939	.5668	.6166	.4442
16	.4057	.6979	.6614	.4120	.6756	.6458	.9200	.8230	.1133	.6206
17	.9355	.3784	.2844	.7446	.6992	.9669	.8447	.6739	.8983	.9517
18	.9169	.8600	.4692	.2679	.7275	.6649	.3678	.9994	.7546	.6400
19	.4103	.8537	.0648	.4399	.4784	.8704	.6208	.9616	.7911	.2473
20	.8936	.5936	.9883	.9334	.5548	.0099	.7313	.0589	.8150	.3527
21	.0579	.4966	.5828	.6833	.1210	.1370	.1939	.3603	.6700	.1879
22	.3529	.8998	.4235	.2126	.4508	.8188	.9048	.5485	.2009	.4906
23	.8132	.8216	.5155	.8392	.7159	.4302	.5692	.2618	.2731	.4093
24	.0099	.6449	.3340	.6288	.8928	.8903	.6318	.5973	.6262	.4635
25	.1389	.8180	.4329	.1338	.2731	.7349	.2344	.0493	.5369	.6109
26	.2028	.6602	.2259	.2071	.2548	.6873	.5488	.5711	.0595	.0712
27	.1987	.3420	.5798	.6072	.8656	.3461	.9316	.7009	.0890	.3143
28	.6038	.2897	.7604	.6299	.2324	.1660	.3352	.9623	.2713	.6084
29	.2722	.3412	.5298	.3705	.8049	.1556	.6555	.7505	.4091	.1750
30	.1988	.5341	.6405	.5751	.9084	.1911	.3919	.7400	.4740	.6210
31	.0153	.7271	.2091	.4514	.2319	.4225	.6273	.4319	.9090	.2460
32	.7468	.3093	.3798	.0439	.2393	.8560	.6991	.6343	.5962	.5874
33	.4451	.8385	.7833	.0272	.0498	.4902	.3972	.8030	.3290	.5061
34	.9318	.5681	.6808	.3127	.0784	.8159	.4136	.0839	.4782	.4648
35	.4660	.3704	.4611	.0129	.6408	.4608	.6552	.9455	.5972	.5414
36	.4186	.7027	.5678	.3840	.1909	.4574	.8376	.9159	.1614	.9423
37	.8462	.5466	.7942	.6831	.8439	.4507	.3716	.6020	.8295	.3418
38	.5252	.4449	.0592	.0928	.1739	.4122	.4253	.2536	.9561	.4018
39	.2026	.6946	.6029	.0353	.1708	.9016	.5947	.8735	.5955	.3077
40	.6721	.6213	.0503	.6124	.9943	.0056	.5657	.5134	.0287	.4116

Table A2. Binomial distribution

$$F(x) = \mathbf{P}\{X \leq x\} = \sum_{k=0}^x \binom{n}{k} p^k (1-p)^{n-k}$$

n	x	p																		
		.050	.100	.150	.200	.250	.300	.350	.400	.450	.500	.550	.600	.650	.700	.750	.800	.850	.900	.950
1	0	.950	.900	.850	.800	.750	.700	.650	.600	.550	.500	.450	.400	.350	.300	.250	.200	.150	.100	.050
2	0	.903	.810	.723	.640	.563	.490	.423	.360	.303	.250	.203	.160	.123	.090	.063	.040	.023	.010	.003
	1	.998	.990	.978	.960	.938	.910	.878	.840	.798	.750	.698	.640	.578	.510	.438	.360	.278	.190	.098
3	0	.857	.729	.614	.512	.422	.343	.275	.216	.166	.125	.091	.064	.043	.027	.016	.008	.003	.001	.000
	1	.993	.972	.939	.896	.844	.784	.718	.648	.575	.500	.425	.352	.282	.216	.156	.104	.061	.028	.007
	2	1.0	.999	.997	.992	.984	.973	.957	.936	.909	.875	.834	.784	.725	.657	.578	.488	.386	.271	.143
4	0	.815	.656	.522	.410	.316	.240	.179	.130	.092	.063	.041	.026	.015	.008	.004	.002	.001	.000	.000
	1	.986	.948	.890	.819	.738	.652	.563	.475	.391	.313	.241	.179	.126	.084	.051	.027	.012	.004	.000
	2	1.0	.996	.988	.973	.949	.916	.874	.821	.759	.688	.609	.525	.437	.348	.262	.181	.110	.052	.014
	3	1.0	1.0	.999	.998	.996	.992	.985	.974	.959	.938	.908	.870	.821	.760	.684	.590	.478	.344	.185
5	0	.774	.590	.444	.328	.237	.168	.116	.078	.050	.031	.018	.010	.005	.002	.001	.000	.000	.000	.000
	1	.977	.919	.835	.737	.633	.528	.428	.337	.256	.188	.131	.087	.054	.031	.016	.007	.002	.000	.000
	2	.999	.991	.973	.942	.896	.837	.765	.683	.593	.500	.407	.317	.235	.163	.104	.058	.027	.009	.001
	3	1.0	1.0	.998	.993	.984	.969	.946	.913	.869	.813	.744	.663	.572	.472	.367	.263	.165	.081	.023
	4	1.0	1.0	1.0	1.0	.999	.998	.995	.990	.982	.969	.950	.922	.884	.832	.763	.672	.556	.410	.226
6	0	.735	.531	.377	.262	.178	.118	.075	.047	.028	.016	.008	.004	.002	.001	.000	.000	.000	.000	.000
	1	.967	.886	.776	.655	.534	.420	.319	.233	.164	.109	.069	.041	.022	.011	.005	.002	.000	.000	.000
	2	.998	.984	.953	.901	.831	.744	.647	.544	.442	.344	.255	.179	.117	.070	.038	.017	.006	.001	.000
	3	1.0	.999	.994	.983	.962	.930	.883	.821	.745	.656	.558	.456	.353	.256	.169	.099	.047	.016	.002
	4	1.0	1.0	1.0	.998	.995	.989	.978	.959	.931	.891	.836	.767	.681	.580	.466	.345	.224	.114	.033
	5	1.0	1.0	1.0	1.0	1.0	.999	.998	.996	.992	.984	.972	.953	.925	.882	.822	.738	.623	.469	.265
7	0	.698	.478	.321	.210	.133	.082	.049	.028	.015	.008	.004	.002	.001	.000	.000	.000	.000	.000	.000
	1	.956	.850	.717	.577	.445	.329	.234	.159	.102	.063	.036	.019	.009	.004	.001	.000	.000	.000	.000
	2	.996	.974	.926	.852	.756	.647	.532	.420	.316	.227	.153	.096	.056	.029	.013	.005	.001	.000	.000
	3	1.0	.997	.988	.967	.929	.874	.800	.710	.608	.500	.392	.290	.200	.126	.071	.033	.012	.003	.000
	4	1.0	1.0	.999	.995	.987	.971	.944	.904	.847	.773	.684	.580	.468	.353	.244	.148	.074	.026	.004
	5	1.0	1.0	1.0	1.0	.999	.996	.991	.981	.964	.938	.898	.841	.766	.671	.555	.423	.283	.150	.044
	6	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.996	.992	.985	.972	.951	.918	.867	.790	.679	.522	.302
8	0	.663	.430	.272	.168	.100	.058	.032	.017	.008	.004	.002	.001	.000	.000	.000	.000	.000	.000	.000
	1	.943	.813	.657	.503	.367	.255	.169	.106	.063	.035	.018	.009	.004	.001	.000	.000	.000	.000	.000
	2	.994	.962	.895	.797	.679	.552	.428	.315	.220	.145	.088	.050	.025	.011	.004	.001	.000	.000	.000
	3	1.0	.995	.979	.944	.886	.806	.706	.594	.477	.363	.260	.174	.106	.058	.027	.010	.003	.000	.000
	4	1.0	1.0	.997	.990	.973	.942	.894	.826	.740	.637	.523	.406	.294	.194	.114	.056	.021	.005	.000
	5	1.0	1.0	1.0	1.0	.999	.996	.995	.975	.950	.912	.855	.780	.685	.572	.448	.321	.203	.105	.038
	6	1.0	1.0	1.0	1.0	1.0	.999	.996	.991	.982	.965	.937	.894	.831	.745	.633	.497	.343	.187	.057
	7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.996	.992	.983	.968	.942	.900	.832	.728	.570	.337
9	0	.630	.387	.232	.134	.075	.040	.021	.010	.005	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000
	1	.929	.775	.599	.436	.300	.196	.121	.071	.039	.020	.009	.004	.001	.000	.000	.000	.000	.000	.000
	2	.992	.947	.859	.738	.601	.463	.337	.232	.150	.090	.050	.025	.011	.004	.001	.000	.000	.000	.000
	3	.999	.992	.966	.914	.834	.730	.609	.483	.361	.254	.166	.099	.054	.025	.010	.003	.001	.000	.000
	4	1.0	.999	.994	.980	.951	.901	.828	.733	.621	.500	.379	.267	.172	.099	.049	.020	.006	.001	.000
	5	1.0	1.0	.999	.997	.990	.975	.946	.901	.834	.746	.639	.517	.391	.270	.166	.086	.034	.008	.001
	6	1.0	1.0	1.0	1.0	1.0	.999	.998	.975	.950	.910	.850	.768	.663	.537	.399	.262	.141	.053	.008
	7	1.0	1.0	1.0	1.0	1.0	1.0	.999	.996	.991	.980	.961	.929	.879	.804	.700	.564	.401	.225	.071
	8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.995	.990	.979	.960	.925	.866	.768	.613	.370
10	0	.599	.349	.197	.107	.056	.028	.013	.006	.003	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.914	.736	.544	.376	.244	.149	.086	.046	.023	.011	.005	.002	.001	.000	.000	.000	.000	.000	.000
	2	.988	.930	.820	.678	.526	.383	.262	.167	.100	.055	.027	.012	.005	.002	.000	.000	.000	.000	.000
	3	.999	.987	.950	.879	.776	.650	.514	.382	.266	.172	.102	.055	.026	.011	.004	.001	.000	.000	.000
	4	1.0	.998	.990	.967	.922	.850	.751	.633	.504	.377	.262	.166	.095	.047	.020	.006	.001	.000	.000
	5	1.0	1.0	.999	.994	.980	.953	.905	.834	.738	.623	.496	.367	.249	.150	.078	.033	.010	.002	.000
	6	1.0	1.0	1.0	.999	.996	.989	.974	.945	.898	.828	.734	.618	.486	.350	.224	.121	.050	.013	.001
	7	1.0	1.0	1.0	1.0	1.0	.998	.995	.988	.973	.945	.900	.833	.738	.617	.474	.322	.180	.070	.012
	8	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.995	.989	.977	.954	.914	.851	.756	.624	.456	.264	.086
	9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.997	.994	.987	.972	.944	.893	.803	.651	.401

Table A2, continued. Binomial distribution

$n$	$x$	$p$																		
		.050	.100	.150	.200	.250	.300	.350	.400	.450	.500	.550	.600	.650	.700	.750	.800	.850	.900	.950
11	0	.569	.314	.167	.086	.042	.020	.009	.004	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.898	.697	.492	.322	.197	.113	.061	.030	.014	.006	.002	.001	.000	.000	.000	.000	.000	.000	.000
	2	.985	.910	.779	.617	.455	.313	.200	.119	.065	.033	.015	.006	.002	.001	.000	.000	.000	.000	.000
	3	.998	.981	.931	.839	.713	.570	.426	.296	.191	.113	.061	.029	.012	.004	.001	.000	.000	.000	.000
	4	1.0	.997	.984	.950	.885	.790	.668	.533	.397	.274	.174	.099	.050	.022	.008	.002	.000	.000	.000
	5	1.0	1.0	.997	.988	.966	.922	.851	.753	.633	.500	.367	.247	.149	.078	.034	.012	.003	.000	.000
	6	1.0	1.0	1.0	.998	.992	.978	.950	.901	.826	.726	.603	.467	.332	.210	.115	.050	.016	.003	.000
	7	1.0	1.0	1.0	1.0	.999	.996	.988	.971	.939	.887	.809	.704	.574	.430	.287	.161	.069	.019	.002
	8	1.0	1.0	1.0	1.0	1.0	.999	.998	.994	.985	.967	.935	.881	.800	.687	.545	.383	.221	.090	.015
	9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.994	.986	.970	.939	.887	.803	.678	.508	.303	.102
10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.996	.991	.980	.958	.914	.833	.686	.431	
12	0	.540	.282	.142	.069	.032	.014	.006	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.882	.659	.443	.275	.158	.085	.042	.020	.008	.003	.001	.000	.000	.000	.000	.000	.000	.000	.000
	2	.980	.889	.736	.558	.391	.253	.151	.083	.042	.019	.008	.003	.001	.000	.000	.000	.000	.000	.000
	3	.998	.974	.908	.795	.649	.493	.347	.225	.134	.073	.036	.015	.006	.002	.000	.000	.000	.000	.000
	4	1.0	.996	.976	.927	.842	.724	.583	.438	.304	.194	.112	.057	.026	.009	.003	.001	.000	.000	.000
	5	1.0	.999	.995	.981	.946	.882	.787	.665	.527	.387	.261	.158	.085	.039	.014	.004	.001	.000	.000
	6	1.0	1.0	.999	.996	.986	.961	.915	.842	.739	.613	.473	.335	.213	.118	.054	.019	.005	.001	.000
	7	1.0	1.0	1.0	.999	.997	.991	.974	.943	.888	.806	.696	.562	.417	.276	.158	.073	.024	.004	.000
	8	1.0	1.0	1.0	1.0	1.0	.998	.994	.985	.964	.927	.866	.775	.653	.507	.351	.205	.092	.026	.002
	9	1.0	1.0	1.0	1.0	1.0	1.0	.999	.997	.992	.981	.958	.917	.849	.747	.609	.442	.264	.111	.020
	10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.997	.992	.980	.958	.915	.842	.725	.557	.341	.118
	11	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.994	.986	.968	.931	.858	.718	.460
13	0	.513	.254	.121	.055	.024	.010	.004	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.865	.621	.398	.234	.127	.064	.030	.013	.005	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000
	2	.975	.866	.692	.502	.333	.202	.113	.058	.027	.011	.004	.001	.000	.000	.000	.000	.000	.000	.000
	3	.997	.966	.882	.747	.584	.421	.278	.169	.093	.046	.020	.008	.003	.001	.000	.000	.000	.000	.000
	4	1.0	.994	.966	.901	.794	.654	.501	.353	.228	.133	.070	.032	.013	.004	.001	.000	.000	.000	.000
	5	1.0	.999	.992	.970	.920	.835	.716	.574	.427	.291	.179	.098	.046	.018	.006	.001	.000	.000	.000
	6	1.0	1.0	.999	.993	.976	.938	.871	.771	.644	.500	.356	.229	.129	.062	.024	.007	.001	.000	.000
	7	1.0	1.0	1.0	.999	.994	.982	.954	.902	.821	.709	.573	.426	.284	.165	.080	.030	.008	.001	.000
	8	1.0	1.0	1.0	1.0	.999	.996	.987	.968	.930	.867	.772	.647	.499	.346	.206	.099	.034	.006	.000
	9	1.0	1.0	1.0	1.0	1.0	.999	.997	.992	.980	.954	.907	.831	.722	.579	.416	.253	.118	.034	.003
	10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.996	.989	.973	.942	.887	.798	.667	.498	.308	.134	.025
	11	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.995	.987	.970	.936	.873	.766	.602	.379	.135
	12	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.996	.990	.976	.945	.879	.746	.487
14	0	.488	.229	.103	.044	.018	.007	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.847	.585	.357	.198	.101	.047	.021	.008	.003	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2	.970	.842	.648	.448	.281	.161	.084	.040	.017	.006	.002	.001	.000	.000	.000	.000	.000	.000	.000
	3	.996	.956	.853	.698	.521	.355	.220	.124	.063	.029	.011	.004	.001	.000	.000	.000	.000	.000	.000
	4	1.0	.991	.953	.870	.742	.584	.423	.279	.167	.090	.043	.018	.006	.002	.000	.000	.000	.000	.000
	5	1.0	.999	.988	.956	.888	.781	.641	.486	.337	.212	.119	.058	.024	.008	.002	.000	.000	.000	.000
	6	1.0	1.0	.998	.988	.962	.907	.816	.692	.546	.395	.259	.150	.075	.031	.010	.002	.000	.000	.000
	7	1.0	1.0	1.0	.998	.990	.969	.925	.850	.741	.605	.454	.308	.184	.093	.038	.012	.002	.000	.000
	8	1.0	1.0	1.0	1.0	.998	.992	.976	.942	.881	.788	.663	.514	.359	.219	.112	.044	.012	.001	.000
	9	1.0	1.0	1.0	1.0	1.0	.998	.994	.982	.957	.910	.833	.721	.577	.416	.258	.130	.047	.009	.000
	10	1.0	1.0	1.0	1.0	1.0	1.0	.999	.996	.989	.971	.937	.876	.780	.645	.479	.302	.147	.044	.004
	11	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.994	.983	.960	.916	.839	.719	.552	.352	.158	.030
	12	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.997	.992	.979	.953	.899	.802	.643	.415	.153
	13	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.993	.982	.956	.897	.771	.512
15	0	.463	.206	.087	.035	.013	.005	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.829	.549	.319	.167	.080	.035	.014	.005	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2	.964	.816	.604	.398	.236	.127	.062	.027	.011	.004	.001	.000	.000	.000	.000	.000	.000	.000	.000
	3	.995	.944	.823	.648	.461	.297	.173	.091	.042	.018	.006	.002	.000	.000	.000	.000	.000	.000	.000
	4	.999	.987	.938	.836	.686	.515	.352	.217	.120	.059	.025	.009	.003	.001	.000	.000	.000	.000	.000
	5	1.0	.998	.983	.939	.852	.722	.564	.403	.261	.151	.077	.034	.012	.004	.001	.000	.000	.000	.000
	6	1.0	1.0	.996	.982	.943	.869	.755	.610	.452	.304	.182	.095	.042	.015	.004	.001	.000	.000	.000
	7	1.0	1.0	.999	.996	.983	.950	.887	.787	.654	.500	.346	.213	.113	.050	.017	.004	.001	.000	.000
	8	1.0	1.0	1.0	.999	.996	.985	.958	.905	.818	.696	.548	.390	.245	.131	.057	.018	.004	.000	.000
	9	1.0	1.0	1.0	1.0	.999	.996	.988	.966	.923	.849	.739	.597	.436	.278	.148	.061	.017	.002	.000
	10	1.0	1.0	1.0	1.0	1.0	.999	.997	.991	.975	.941	.880	.783	.648	.485	.314	.164	.062	.013	.001
	11	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.998	.994	.982	.958	.909	.827	.703	.539	.352	.177	.056	.005
	12	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.996	.989	.973	.938	.873	.764	.602	.396	.184	.036
	13	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.998	.995	.986	.965	.920	.833	.681	.451	.171
	14	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.998	.998	.995	.987	.965	.913	.794	.537

Table A2, continued. Binomial distribution

n	x	p																		
		.050	.100	.150	.200	.250	.300	.350	.400	.450	.500	.550	.600	.650	.700	.750	.800	.850	.900	.950
16	1	.811	.515	.284	.141	.063	.026	.010	.003	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2	.957	.789	.561	.352	.197	.099	.045	.018	.007	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000
	3	.993	.932	.790	.598	.405	.246	.134	.065	.028	.011	.003	.001	.000	.000	.000	.000	.000	.000	.000
	4	.999	.983	.921	.798	.630	.450	.289	.167	.085	.038	.015	.005	.001	.000	.000	.000	.000	.000	.000
	5	1.0	.997	.976	.918	.810	.660	.490	.329	.198	.105	.049	.019	.006	.002	.000	.000	.000	.000	.000
	6	1.0	.999	.994	.973	.920	.825	.688	.527	.366	.227	.124	.058	.023	.007	.002	.000	.000	.000	.000
	7	1.0	1.0	.999	.993	.973	.926	.841	.716	.563	.402	.256	.142	.067	.026	.007	.001	.000	.000	.000
	8	1.0	1.0	1.0	.999	.993	.974	.933	.858	.744	.598	.437	.284	.159	.074	.027	.007	.001	.000	.000
	9	1.0	1.0	1.0	1.0	.998	.993	.977	.942	.876	.773	.634	.473	.312	.175	.080	.027	.006	.001	.000
	10	1.0	1.0	1.0	1.0	1.0	.998	.994	.981	.951	.895	.802	.671	.510	.340	.190	.082	.024	.003	.000
	11	1.0	1.0	1.0	1.0	1.0	1.0	.999	.995	.985	.962	.915	.833	.711	.550	.370	.202	.079	.017	.001
	12	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.997	.989	.972	.935	.866	.754	.595	.402	.210	.068	.007
	13	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.998	.993	.982	.955	.901	.803	.648	.439	.211	.043
	14	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.997	.990	.974	.937	.859	.716	.485	.189	
	15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.997	.990	.972	.926	.815	.560	
18	1	.774	.450	.224	.099	.039	.014	.005	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2	.942	.734	.480	.271	.135	.060	.024	.008	.003	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000
	3	.989	.902	.720	.501	.306	.165	.078	.033	.012	.004	.001	.000	.000	.000	.000	.000	.000	.000	.000
	y 4	.998	.972	.879	.716	.519	.333	.189	.094	.041	.015	.005	.001	.000	.000	.000	.000	.000	.000	.000
	5	1.0	.994	.958	.867	.717	.534	.355	.209	.108	.048	.018	.006	.001	.000	.000	.000	.000	.000	.000
	6	1.0	.999	.988	.949	.861	.722	.549	.374	.226	.119	.054	.020	.006	.001	.000	.000	.000	.000	.000
	7	1.0	1.0	.997	.984	.943	.859	.728	.563	.391	.240	.128	.058	.021	.006	.001	.000	.000	.000	.000
	8	1.0	1.0	.999	.996	.981	.940	.861	.737	.578	.407	.253	.135	.060	.021	.005	.001	.000	.000	.000
	9	1.0	1.0	1.0	.999	.995	.979	.940	.865	.747	.593	.422	.263	.139	.060	.019	.004	.001	.000	.000
	10	1.0	1.0	1.0	1.0	.999	.994	.979	.942	.872	.760	.609	.437	.272	.141	.057	.016	.003	.000	.000
	11	1.0	1.0	1.0	1.0	1.0	.999	.994	.980	.946	.881	.774	.626	.451	.278	.139	.051	.012	.001	.000
	12	1.0	1.0	1.0	1.0	1.0	1.0	.999	.994	.982	.952	.892	.791	.645	.466	.283	.133	.042	.006	.000
	13	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.995	.985	.959	.906	.811	.667	.481	.284	.121	.028	.002
	14	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.996	.988	.967	.922	.835	.694	.499	.280	.098	.011
	15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.997	.992	.976	.940	.865	.729	.520	.266	.058
	16	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.995	.986	.961	.901	.776	.550	.226	
20	1	.736	.392	.176	.069	.024	.008	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2	.925	.677	.405	.206	.091	.035	.012	.004	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	y 3	.984	.867	.648	.411	.225	.107	.044	.016	.005	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000
	4	.997	.957	.830	.630	.415	.238	.118	.051	.019	.006	.002	.000	.000	.000	.000	.000	.000	.000	.000
	5	1.0	.989	.933	.804	.617	.416	.245	.126	.055	.021	.006	.002	.000	.000	.000	.000	.000	.000	.000
	6	1.0	.998	.978	.913	.786	.608	.417	.250	.130	.058	.021	.006	.002	.000	.000	.000	.000	.000	.000
	7	1.0	1.0	.994	.968	.898	.772	.601	.416	.252	.132	.058	.021	.006	.001	.000	.000	.000	.000	.000
	8	1.0	1.0	.999	.990	.959	.887	.762	.596	.414	.252	.131	.057	.020	.005	.001	.000	.000	.000	.000
	9	1.0	1.0	1.0	.997	.986	.952	.878	.755	.591	.412	.249	.128	.053	.017	.004	.001	.000	.000	.000
	10	1.0	1.0	1.0	.999	.996	.983	.947	.872	.751	.588	.409	.245	.122	.048	.014	.003	.000	.000	.000
	11	1.0	1.0	1.0	1.0	.999	.995	.980	.943	.869	.748	.586	.404	.238	.113	.041	.010	.001	.000	.000
	12	1.0	1.0	1.0	1.0	1.0	.999	.994	.979	.942	.868	.748	.584	.399	.228	.102	.032	.006	.000	.000
	13	1.0	1.0	1.0	1.0	1.0	1.0	.998	.994	.979	.942	.870	.750	.583	.392	.214	.087	.022	.002	.000
	14	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.998	.994	.979	.945	.874	.755	.584	.383	.196	.067	.011	.000
	15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.998	.994	.981	.949	.882	.762	.585	.370	.170	.043	.003
	16	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.995	.984	.956	.893	.775	.589	.352	.133	.016
25	2	.873	.537	.254	.098	.032	.009	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	3	.966	.764	.471	.234	.096	.033	.010	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	4	.993	.902	.682	.421	.214	.090	.032	.009	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	5	.999	.967	.838	.617	.378	.193	.083	.029	.009	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000
	6	1.0	.991	.930	.780	.561	.341	.173	.074	.026	.007	.002	.000	.000	.000	.000	.000	.000	.000	.000
	7	1.0	.998	.975	.891	.727	.512	.306	.154	.064	.022	.006	.001	.000	.000	.000	.000	.000	.000	.000
	8	1.0	1.0	.992	.953	.851	.677	.467	.274	.134	.054	.017	.004	.001	.000	.000	.000	.000	.000	.000
	9	1.0	1.0	.998	.983	.929	.811	.630	.425	.242	.115	.044	.013	.003	.000	.000	.000	.000	.000	.000
	10	1.0	1.0	1.0	.994	.970	.902	.771	.586	.384	.212	.096	.034	.009	.002	.000	.000	.000	.000	.000
	11	1.0	1.0	1.0	.998	.989	.956	.875	.732	.543	.345	.183	.078	.025	.006	.001	.000	.000	.000	.000
	12	1.0	1.0	1.0	1.0	.997	.983	.940	.846	.694	.500	.306	.154	.060	.017	.003	.000	.000	.000	.000
	13	1.0	1.0	1.0	1.0	1.0	.999	.994	.975	.922	.817	.655	.457	.268	.125	.044	.011	.002	.000	.000
	14	1.0	1.0	1.0	1.0	1.0	.998	.991	.966	.904	.788	.616	.414	.229	.098	.030	.006	.000	.000	.000
	15	1.0	1.0	1.0	1.0	1.0	1.0	.997	.987	.956	.885	.758	.575	.370	.189	.071	.017	.002	.000	.000
	16	1.0	1.0	1.0	1.0	1.0	1.0	.999	.996	.983	.946	.866	.726	.533	.323	.149	.047	.008	.000	.000
	17	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.999	.994	.978	.936	.846	.694	.488	.273	.109	.025	.002	.000
	18	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.998	.993	.974	.926	.827	.659	.439	.220	.070	.009	.000
	19	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.998	.991	.971	.917	.807	.622	.383	.162	.033	.001
	20	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.998	.991	.968	.910	.786	.579	.318	.098	.007

**Table A3. Poisson distribution**

$$F(x) = P\{X \leq x\} = \sum_{k=0}^x \frac{e^{-\lambda} \lambda^k}{k!}$$

$x$	$\lambda$														
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
0	.905	.819	.741	.670	.607	.549	.497	.449	.407	.368	.333	.301	.273	.247	.223
1	.995	.982	.963	.938	.910	.878	.844	.809	.772	.736	.699	.663	.627	.592	.558
2	1.00	.999	.996	.992	.986	.977	.966	.953	.937	.920	.900	.879	.857	.833	.809
3	1.00	1.00	1.00	.999	.998	.997	.994	.991	.987	.981	.974	.966	.957	.946	.934
4	1.00	1.00	1.00	1.00	1.00	1.00	.999	.999	.998	.996	.995	.992	.989	.986	.981
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.999	.998	.998	.997	.996
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.999
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

$x$	$\lambda$														
	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
0	.202	.183	.165	.150	.135	.122	.111	.100	.091	.082	.074	.067	.061	.055	.050
1	.525	.493	.463	.434	.406	.380	.355	.331	.308	.287	.267	.249	.231	.215	.199
2	.783	.757	.731	.704	.677	.650	.623	.596	.570	.544	.518	.494	.469	.446	.423
3	.921	.907	.891	.875	.857	.839	.819	.799	.779	.758	.736	.714	.692	.670	.647
4	.976	.970	.964	.956	.947	.938	.928	.916	.904	.891	.877	.863	.848	.832	.815
5	.994	.992	.990	.987	.983	.980	.975	.970	.964	.958	.951	.943	.935	.926	.916
6	.999	.998	.997	.997	.995	.994	.993	.991	.988	.986	.983	.979	.976	.971	.966
7	1.00	1.00	.999	.999	.999	.999	.998	.997	.997	.996	.995	.993	.992	.990	.988
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.999	.999	.999	.998	.998	.997	.996
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.999	.999	.999
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

$x$	$\lambda$														
	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5
0	.030	.018	.011	.007	.004	.002	.002	.001	.001	.000	.000	.000	.000	.000	.000
1	.136	.092	.061	.040	.027	.017	.011	.007	.005	.003	.002	.001	.001	.000	.000
2	.321	.238	.174	.125	.088	.062	.043	.030	.020	.014	.009	.006	.004	.003	.002
3	.537	.433	.342	.265	.202	.151	.112	.082	.059	.042	.030	.021	.015	.010	.007
4	.725	.629	.532	.440	.358	.285	.224	.173	.132	.100	.074	.055	.040	.029	.021
5	.858	.785	.703	.616	.529	.446	.369	.301	.241	.191	.150	.116	.089	.067	.050
6	.935	.889	.831	.762	.686	.606	.527	.450	.378	.313	.256	.207	.165	.130	.102
7	.973	.949	.913	.867	.809	.744	.673	.599	.525	.453	.386	.324	.269	.220	.179
8	.990	.979	.960	.932	.894	.847	.792	.729	.662	.593	.523	.456	.392	.333	.279
9	.997	.992	.983	.968	.946	.916	.877	.830	.776	.717	.653	.587	.522	.458	.397
10	.999	.997	.993	.986	.975	.957	.933	.901	.862	.816	.763	.706	.645	.583	.521
11	1.00	.999	.998	.995	.989	.980	.966	.947	.921	.888	.849	.803	.752	.697	.639
12	1.00	1.00	.999	.998	.996	.991	.984	.973	.957	.936	.909	.876	.836	.792	.742
13	1.00	1.00	1.00	.999	.998	.996	.993	.987	.978	.966	.949	.926	.898	.864	.825
14	1.00	1.00	1.00	1.00	.999	.999	.997	.994	.990	.983	.973	.959	.940	.917	.888
15	1.00	1.00	1.00	1.00	1.00	.999	.999	.998	.995	.992	.986	.978	.967	.951	.932
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.998	.996	.993	.989	.982	.973	.960
17	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.998	.997	.995	.991	.986	.978
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.999	.998	.996	.993	.988
19	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.999	.998	.997	.994
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.998	.997

Table A3, continued. Poisson distribution

x	$\lambda$														
	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30
0	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	.001	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	.005	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
4	.015	.008	.004	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
5	.038	.020	.011	.006	.003	.001	.001	.000	.000	.000	.000	.000	.000	.000	.000
6	.079	.046	.026	.014	.008	.004	.002	.001	.001	.000	.000	.000	.000	.000	.000
7	.143	.090	.054	.032	.018	.010	.005	.003	.002	.001	.000	.000	.000	.000	.000
8	.232	.155	.100	.062	.037	.022	.013	.007	.004	.002	.001	.000	.000	.000	.000
9	.341	.242	.166	.109	.070	.043	.026	.015	.009	.005	.002	.000	.000	.000	.000
10	.460	.347	.252	.176	.118	.077	.049	.030	.018	.011	.004	.001	.000	.000	.000
11	.579	.462	.353	.260	.185	.127	.085	.055	.035	.021	.008	.003	.001	.000	.000
12	.689	.576	.463	.358	.268	.193	.135	.092	.061	.039	.015	.005	.002	.001	.000
13	.781	.682	.573	.464	.363	.275	.201	.143	.098	.066	.028	.011	.004	.001	.000
14	.854	.772	.675	.570	.466	.368	.281	.208	.150	.105	.048	.020	.008	.003	.001
15	.907	.844	.764	.669	.568	.467	.371	.287	.215	.157	.077	.034	.014	.005	.002
16	.944	.899	.835	.756	.664	.566	.468	.375	.292	.221	.117	.056	.025	.010	.004
17	.968	.937	.890	.827	.749	.659	.564	.469	.378	.297	.169	.087	.041	.018	.007
18	.982	.963	.930	.883	.819	.742	.655	.562	.469	.381	.232	.128	.065	.030	.013
19	.991	.979	.957	.923	.875	.812	.736	.651	.561	.470	.306	.180	.097	.048	.022
20	.995	.988	.975	.952	.917	.868	.805	.731	.647	.559	.387	.243	.139	.073	.035
21	.998	.994	.986	.971	.947	.911	.861	.799	.725	.644	.472	.314	.190	.106	.054
22	.999	.997	.992	.983	.967	.942	.905	.855	.793	.721	.556	.392	.252	.148	.081
23	1.00	.999	.996	.991	.981	.963	.937	.899	.849	.787	.637	.473	.321	.200	.115
24	1.00	.999	.998	.995	.989	.978	.959	.932	.893	.843	.712	.554	.396	.260	.157
25	1.00	1.00	.999	.997	.994	.987	.975	.955	.927	.888	.777	.632	.474	.327	.208
26	1.00	1.00	1.00	.999	.997	.993	.985	.972	.951	.922	.832	.704	.552	.400	.267
27	1.00	1.00	1.00	.999	.998	.996	.991	.983	.969	.948	.877	.768	.627	.475	.333
28	1.00	1.00	1.00	1.00	.999	.998	.995	.990	.980	.966	.913	.823	.697	.550	.403
29	1.00	1.00	1.00	1.00	1.00	.999	.997	.994	.988	.978	.940	.868	.759	.623	.476
30	1.00	1.00	1.00	1.00	1.00	.999	.999	.997	.993	.987	.959	.904	.813	.690	.548
31	1.00	1.00	1.00	1.00	1.00	1.00	.999	.998	.996	.992	.973	.932	.859	.752	.619
32	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.998	.995	.983	.953	.896	.805	.685
33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.997	.989	.969	.925	.850	.744
34	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.999	.994	.979	.947	.888	.797
35	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.996	.987	.964	.918	.843
36	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.998	.992	.976	.941	.880
37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.995	.984	.959	.911
38	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.997	.990	.972	.935
39	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.998	.994	.981	.954
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.996	.988	.968
41	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.998	.992	.978
42	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.995	.985
43	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.997	.990
44	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.998	.994
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.996
46	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999	.998
47	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999
48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999
49	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.999
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table A4. Standard Normal distribution

$$\Phi(z) = P\{Z \leq z\} = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^z e^{-x^2/2} dx$$

$z$	-0.09	-0.08	-0.07	-0.06	-0.05	-0.04	-0.03	-0.02	-0.01	-0.00
-(3.9+)	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
-3.8	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001
-3.7	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001
-3.6	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0002	.0002
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0002	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003
-3.3	.0003	.0004	.0004	.0004	.0004	.0004	.0004	.0005	.0005	.0005
-3.2	.0005	.0005	.0005	.0006	.0006	.0006	.0006	.0006	.0007	.0007
-3.1	.0007	.0007	.0008	.0008	.0008	.0008	.0009	.0009	.0009	.0010
-3.0	.0010	.0010	.0011	.0011	.0011	.0012	.0012	.0013	.0013	.0013
-2.9	.0014	.0014	.0015	.0015	.0016	.0016	.0017	.0018	.0018	.0019
-2.8	.0019	.0020	.0021	.0021	.0022	.0023	.0023	.0024	.0025	.0026
-2.7	.0026	.0027	.0028	.0029	.0030	.0031	.0032	.0033	.0034	.0035
-2.6	.0036	.0037	.0038	.0039	.0040	.0041	.0043	.0044	.0045	.0047
-2.5	.0048	.0049	.0051	.0052	.0054	.0055	.0057	.0059	.0060	.0062
-2.4	.0064	.0066	.0068	.0069	.0071	.0073	.0075	.0078	.0080	.0082
-2.3	.0084	.0087	.0089	.0091	.0094	.0096	.0099	.0102	.0104	.0107
-2.2	.0110	.0113	.0116	.0119	.0122	.0125	.0129	.0132	.0136	.0139
-2.1	.0143	.0146	.0150	.0154	.0158	.0162	.0166	.0170	.0174	.0179
-2.0	.0183	.0188	.0192	.0197	.0202	.0207	.0212	.0217	.0222	.0228
-1.9	.0233	.0239	.0244	.0250	.0256	.0262	.0268	.0274	.0281	.0287
-1.8	.0294	.0301	.0307	.0314	.0322	.0329	.0336	.0344	.0351	.0359
-1.7	.0367	.0375	.0384	.0392	.0401	.0409	.0418	.0427	.0436	.0446
-1.6	.0455	.0465	.0475	.0485	.0495	.0505	.0516	.0526	.0537	.0548
-1.5	.0559	.0571	.0582	.0594	.0606	.0618	.0630	.0643	.0655	.0668
-1.4	.0681	.0694	.0708	.0721	.0735	.0749	.0764	.0778	.0793	.0808
-1.3	.0823	.0838	.0853	.0869	.0885	.0901	.0918	.0934	.0951	.0968
-1.2	.0985	.1003	.1020	.1038	.1056	.1075	.1093	.1112	.1131	.1151
-1.1	.1170	.1190	.1210	.1230	.1251	.1271	.1292	.1314	.1335	.1357
-1.0	.1379	.1401	.1423	.1446	.1469	.1492	.1515	.1539	.1562	.1587
-0.9	.1611	.1635	.1660	.1685	.1711	.1736	.1762	.1788	.1814	.1841
-0.8	.1867	.1894	.1922	.1949	.1977	.2005	.2033	.2061	.2090	.2119
-0.7	.2148	.2177	.2206	.2236	.2266	.2296	.2327	.2358	.2389	.2420
-0.6	.2451	.2483	.2514	.2546	.2578	.2611	.2643	.2676	.2709	.2743
-0.5	.2776	.2810	.2843	.2877	.2912	.2946	.2981	.3015	.3050	.3085
-0.4	.3121	.3156	.3192	.3228	.3264	.3300	.3336	.3372	.3409	.3446
-0.3	.3483	.3520	.3557	.3594	.3632	.3669	.3707	.3745	.3783	.3821
-0.2	.3859	.3897	.3936	.3974	.4013	.4052	.4090	.4129	.4168	.4207
-0.1	.4247	.4286	.4325	.4364	.4404	.4443	.4483	.4522	.4562	.4602
-0.0	.4641	.4681	.4721	.4761	.4801	.4840	.4880	.4920	.4960	.5000

Table A4, continued. Standard Normal distribution

[illegible]



**Table A5. Table of Student's T-distribution** $t_\alpha$ ; critical values, such that  $P\{t > t_\alpha\} = \alpha$ 

$\nu$ (d.f.)	$\alpha$ , the right-tail probability									
	.10	.05	.025	.02	.01	.005	.0025	.001	.0005	.0001
1	3.078	6.314	12.706	15.89	31.82	63.66	127.3	318.3	636.6	3185
2	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60	70.71
3	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.92	22.20
4	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610	13.04
5	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.894	6.869	9.676
6	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959	8.023
7	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408	7.064
8	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041	6.442
9	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781	6.009
10	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587	5.694
11	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437	5.453
12	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318	5.263
13	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221	5.111
14	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140	4.985
15	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073	4.880
16	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015	4.790
17	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965	4.715
18	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.610	3.922	4.648
19	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883	4.590
20	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850	4.539
21	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3.527	3.819	4.492
22	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792	4.452
23	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3.485	3.768	4.416
24	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745	4.382
25	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3.450	3.725	4.352
26	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707	4.324
27	1.314	1.703	2.052	2.158	2.473	2.771	3.057	3.421	3.689	4.299
28	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674	4.276
29	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3.396	3.660	4.254
30	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3.385	3.646	4.234
32	1.309	1.694	2.037	2.141	2.449	2.738	3.015	3.365	3.622	4.198
34	1.307	1.691	2.032	2.136	2.441	2.728	3.002	3.348	3.601	4.168
36	1.306	1.688	2.028	2.131	2.434	2.719	2.990	3.333	3.582	4.140
38	1.304	1.686	2.024	2.127	2.429	2.712	2.980	3.319	3.566	4.115
40	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551	4.094
45	1.301	1.679	2.014	2.115	2.412	2.690	2.952	3.281	3.520	4.049
50	1.299	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496	4.014
55	1.297	1.673	2.004	2.104	2.396	2.668	2.925	3.245	3.476	3.985
60	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3.232	3.460	3.962
70	1.294	1.667	1.994	2.093	2.381	2.648	2.899	3.211	3.435	3.926
80	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3.195	3.416	3.899
90	1.291	1.662	1.987	2.084	2.368	2.632	2.878	3.183	3.402	3.878
100	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3.174	3.390	3.861
200	1.286	1.653	1.972	2.067	2.345	2.601	2.838	3.131	3.340	3.789
$\infty$	1.282	1.645	1.960	2.054	2.326	2.576	2.807	3.090	3.290	3.719

**Table A6. Table of Chi-Square Distribution** $\chi^2_\alpha$ ; critical values, such that  $P\{\chi^2 > \chi^2_\alpha\} = \alpha$ 

$\nu$ (d.f.)	$\alpha$ , the right-tail probability													
	.999	.995	.99	.975	.95	.90	.80	.20	.10	.05	.025	.01	.005	.001
1	0.00	0.00	0.00	0.00	0.00	0.02	0.06	1.64	2.71	3.84	5.02	6.63	7.88	10.8
2	0.00	0.01	0.02	0.05	0.10	0.21	0.45	3.22	4.61	5.99	7.38	9.21	10.6	13.8
3	0.02	0.07	0.11	0.22	0.35	0.58	1.01	4.64	6.25	7.81	9.35	11.3	12.8	16.3
4	0.09	0.21	0.30	0.48	0.71	1.06	1.65	5.99	7.78	9.49	11.1	13.3	14.9	18.5
5	0.21	0.41	0.55	0.83	1.15	1.61	2.34	7.29	9.24	11.1	12.8	15.1	16.7	20.5
6	0.38	0.68	0.87	1.24	1.64	2.20	3.07	8.56	10.6	12.6	14.4	16.8	18.5	22.5
7	0.60	0.99	1.24	1.69	2.17	2.83	3.82	9.80	12.0	14.1	16.0	18.5	20.3	24.3
8	0.86	1.34	1.65	2.18	2.73	3.49	4.59	11.0	13.4	15.5	17.5	20.1	22.0	26.1
9	1.15	1.73	2.09	2.70	3.33	4.17	5.38	12.2	14.7	16.9	19.0	21.7	23.6	27.9
10	1.48	2.16	2.56	3.25	3.94	4.87	6.18	13.4	16.0	18.3	20.5	23.2	25.2	29.6
11	1.83	2.60	3.05	3.82	4.57	5.58	6.99	14.6	17.3	19.7	21.9	24.7	26.8	31.3
12	2.21	3.07	3.57	4.40	5.23	6.30	7.81	15.8	18.5	21.0	23.3	26.2	28.3	32.9
13	2.62	3.57	4.11	5.01	5.89	7.04	8.63	17.0	19.8	22.4	24.7	27.7	29.8	34.5
14	3.04	4.07	4.66	5.63	6.57	7.79	9.47	18.2	21.1	23.7	26.1	29.1	31.3	36.1
15	3.48	4.60	5.23	6.26	7.26	8.55	10.3	19.3	22.3	25.0	27.5	30.6	32.8	37.7
16	3.94	5.14	5.81	6.91	7.96	9.31	11.1	20.5	23.5	26.3	28.8	32.0	34.3	39.3
17	4.42	5.70	6.41	7.56	8.67	10.1	12.0	21.6	24.8	27.6	30.2	33.4	35.7	40.8
18	4.90	6.26	7.01	8.23	9.39	10.9	12.9	22.8	26.0	28.9	31.5	34.8	37.2	42.3
19	5.41	6.84	7.63	8.91	10.1	11.7	13.7	23.9	27.2	30.1	32.9	36.2	38.6	43.8
20	5.92	7.43	8.26	9.59	10.9	12.4	14.6	25.0	28.4	31.4	34.2	37.6	40.0	45.3
21	6.45	8.03	8.90	10.3	11.6	13.2	15.4	26.2	29.6	32.7	35.5	38.9	41.4	46.8
22	6.98	8.64	9.54	11.0	12.3	14.0	16.3	27.3	30.8	33.9	36.8	40.3	42.8	48.3
23	7.53	9.26	10.2	11.7	13.1	14.8	17.2	28.4	32.0	35.2	38.1	41.6	44.2	49.7
24	8.08	9.89	10.9	12.4	13.8	15.7	18.1	29.6	33.2	36.4	39.4	43.0	45.6	51.2
25	8.65	10.5	11.5	13.1	14.6	16.5	18.9	30.7	34.4	37.7	40.6	44.3	46.9	52.6
26	9.22	11.2	12.2	13.8	15.4	17.3	19.8	31.8	35.6	38.9	41.9	45.6	48.3	54.1
27	9.80	11.8	12.9	14.6	16.2	18.1	20.7	32.9	36.7	40.1	43.2	47.0	49.6	55.5
28	10.4	12.5	13.6	15.3	16.9	18.9	21.6	34.0	37.9	41.3	44.5	48.3	51.0	56.9
29	11.0	13.1	14.3	16.0	17.7	19.8	22.5	35.1	39.1	42.6	45.7	49.6	52.3	58.3
30	11.6	13.8	15.0	16.8	18.5	20.6	23.4	36.3	40.3	43.8	47.0	50.9	53.7	59.7
31	12.2	14.5	15.7	17.5	19.3	21.4	24.3	37.4	41.4	45.0	48.2	52.2	55.0	61.1
32	12.8	15.1	16.4	18.3	20.1	22.3	25.1	38.5	42.6	46.2	49.5	53.5	56.3	62.5
33	13.4	15.8	17.1	19.0	20.9	23.1	26.0	39.6	43.7	47.4	50.7	54.8	57.6	63.9
34	14.1	16.5	17.8	19.8	21.7	24.0	26.9	40.7	44.9	48.6	52.0	56.1	59.0	65.2
35	14.7	17.2	18.5	20.6	22.5	24.8	27.8	41.8	46.1	49.8	53.2	57.3	60.3	66.6
36	15.3	17.9	19.2	21.3	23.3	25.6	28.7	42.9	47.2	51.0	54.4	58.6	61.6	68
37	16.0	18.6	20.0	22.1	24.1	26.5	29.6	44.0	48.4	52.2	55.7	59.9	62.9	69.3
38	16.6	19.3	20.7	22.9	24.9	27.3	30.5	45.1	49.5	53.4	56.9	61.2	64.2	70.7
39	17.3	20.0	21.4	23.7	25.7	28.2	31.4	46.2	50.7	54.6	58.1	62.4	65.5	72.1
40	17.9	20.7	22.2	24.4	26.5	29.1	32.3	47.3	51.8	55.8	59.3	63.7	66.8	73.4
41	18.6	21.4	22.9	25.2	27.3	29.9	33.3	48.4	52.9	56.9	60.6	65.0	68.1	74.7
42	19.2	22.1	23.7	26.0	28.1	30.8	34.2	49.5	54.1	58.1	61.8	66.2	69.3	76.1
43	19.9	22.9	24.4	26.8	29.0	31.6	35.1	50.5	55.2	59.3	63.0	67.5	70.6	77.4
44	20.6	23.6	25.1	27.6	29.8	32.5	36.0	51.6	56.4	60.5	64.2	68.7	71.9	78.7
45	21.3	24.3	25.9	28.4	30.6	33.4	36.9	52.7	57.5	61.7	65.4	70.0	73.2	80.1
46	21.9	25.0	26.7	29.2	31.4	34.2	37.8	53.8	58.6	62.8	66.6	71.2	74.4	81.4
47	22.6	25.8	27.4	30.0	32.3	35.1	38.7	54.9	59.8	64.0	67.8	72.4	75.7	82.7
48	23.3	26.5	28.2	30.8	33.1	35.9	39.6	56.0	60.9	65.2	69.0	73.7	77.0	84.0
49	24.0	27.2	28.9	31.6	33.9	36.8	40.5	57.1	62.0	66.3	70.2	74.9	78.2	85.4
50	24.7	28.0	29.7	32.4	34.8	37.7	41.4	58.2	63.2	67.5	71.4	76.2	79.5	86.7

Table A7. Table of F-distribution

 $F_\alpha$ ; critical values such that  $\mathbf{P}\{F > F_\alpha\} = \alpha$ 

$\nu_2$ , denom. d.f.	$\alpha$	$\nu_1$ , numerator degrees of freedom									
		1	2	3	4	5	6	7	8	9	10
1	0.25	5.83	7.5	8.2	8.58	8.82	8.98	9.1	9.19	9.26	9.32
	0.1	39.9	49.5	53.6	55.8	57.2	58.2	58.9	59.4	59.9	60.2
	0.05	161	199	216	225	230	234	237	239	241	242
	0.025	648	799	864	900	922	937	948	957	963	969
	0.01	4052	4999	5403	5625	5764	5859	5928	5981	6022	6056
	0.005	16211	19999	21615	22500	23056	23437	23715	23925	24091	24224
	0.001	405284	499999	540379	562500	576405	585937	592873	598144	602284	605621
2	0.25	2.57	3	3.15	3.23	3.28	3.31	3.34	3.35	3.37	3.38
	0.1	8.53	9	9.16	9.24	9.29	9.33	9.35	9.37	9.38	9.39
	0.05	18.5	19	19.2	19.2	19.3	19.3	19.4	19.4	19.4	19.4
	0.025	38.5	39	39.2	39.2	39.3	39.3	39.4	39.4	39.4	39.4
	0.01	98.5	99	99.2	99.2	99.3	99.3	99.4	99.4	99.4	99.4
	0.005	199	199	199	199	199	199	199	199	199	199
	0.001	999	999	999	999	999	999	999	999	999	999
3	0.25	2.02	2.28	2.36	2.39	2.41	2.42	2.43	2.44	2.44	2.44
	0.1	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24	5.23
	0.05	10.1	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79
	0.025	17.4	16	15.4	15.1	14.9	14.7	14.6	14.5	14.5	14.4
	0.01	34.1	30.8	29.5	28.7	28.2	27.9	27.7	27.5	27.3	27.2
	0.005	55.6	49.8	47.5	46.2	45.4	44.8	44.4	44.1	43.9	43.7
	0.001	167	149	141	137	135	133	132	131	130	129
4	0.25	1.81	2	2.05	2.06	2.07	2.08	2.08	2.08	2.08	2.08
	0.1	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94	3.92
	0.05	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6	5.96
	0.025	12.2	10.6	9.98	9.6	9.36	9.2	9.07	8.98	8.9	8.84
	0.01	21.2	18	16.7	16	15.5	15.2	15	14.8	14.7	14.5
	0.005	31.3	26.3	24.3	23.2	22.5	22	21.6	21.4	21.1	21
	0.001	74.1	61.2	56.2	53.4	51.7	50.5	49.7	49	48.5	48.1
5	0.25	1.69	1.85	1.88	1.89	1.89	1.89	1.89	1.89	1.89	1.89
	0.1	4.06	3.78	3.62	3.52	3.45	3.4	3.37	3.34	3.32	3.3
	0.05	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74
	0.025	10	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68	6.62
	0.01	16.3	13.3	12.1	11.4	11	10.7	10.5	10.3	10.2	10.1
	0.005	22.8	18.3	16.5	15.6	14.9	14.5	14.2	14	13.8	13.6
	0.001	47.2	37.1	33.2	31.1	29.8	28.8	28.2	27.6	27.2	26.9
6	0.25	1.62	1.76	1.78	1.79	1.79	1.78	1.78	1.78	1.77	1.77
	0.1	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96	2.94
	0.05	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.1	4.06
	0.025	8.81	7.26	6.6	6.23	5.99	5.82	5.7	5.6	5.52	5.46
	0.01	13.7	10.9	9.78	9.15	8.75	8.47	8.26	8.1	7.98	7.87
	0.005	18.6	14.5	12.9	12	11.5	11.1	10.8	10.6	10.4	10.3
	0.001	35.5	27	23.7	21.9	20.8	20	19.5	19	18.7	18.4
8	0.25	1.54	1.66	1.67	1.66	1.66	1.65	1.64	1.64	1.63	1.63
	0.1	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56	2.54
	0.05	5.32	4.46	4.07	3.84	3.69	3.58	3.5	3.44	3.39	3.35
	0.025	7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36	4.3
	0.01	11.3	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81
	0.005	14.7	11	9.6	8.81	8.3	7.95	7.69	7.5	7.34	7.21
	0.001	25.4	18.5	15.8	14.4	13.5	12.9	12.4	12	11.8	11.5
10	0.25	1.49	1.6	1.6	1.59	1.59	1.58	1.57	1.56	1.56	1.55
	0.1	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35	2.32
	0.05	4.96	4.1	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98
	0.025	6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.78	3.72
	0.01	10	7.56	6.55	5.99	5.64	5.39	5.2	5.06	4.94	4.85
	0.005	12.8	9.43	8.08	7.34	6.87	6.54	6.3	6.12	5.97	5.85
	0.001	21	14.9	12.6	11.3	10.5	9.93	9.52	9.2	8.96	8.75

Table A7, continued. F-distribution

$\nu_2$ , denom. d.f.	$\alpha$	$\nu_1$ , numerator degrees of freedom									
		15	20	25	30	40	50	100	200	500	$\infty$
1	0.25	9.49	9.58	9.63	9.67	9.71	9.74	9.8	9.82	9.84	9.85
	0.1	61.2	61.7	62.1	62.3	62.5	62.7	63	63.2	63.3	63.3
	0.05	246	248	249	250	251	252	253	254	254	254
	0.025	985	993	998	1001	1006	1008	1013	1016	1017	1018
	0.01	6157	6209	6240	6261	6287	6303	6334	6350	6360	6366
	0.005	24630	24836	24960	25044	25148	25211	25337	25401	25439	25464
2	0.001	615764	620908	624017	626099	628712	630285	633444	635030	635983	636619
	0.25	3.41	3.43	3.44	3.44	3.45	3.46	3.47	3.47	3.47	3.48
	0.1	9.42	9.44	9.45	9.46	9.47	9.47	9.48	9.49	9.49	9.49
	0.05	19.4	19.4	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
	0.025	39.4	39.4	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
	0.01	99.4	99.4	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5
3	0.005	199	199	199	199	199	199	199	199	199	199
	0.001	999	999	999	999	999	999	999	999	999	999
	0.25	2.46	2.46	2.46	2.47	2.47	2.47	2.47	2.47	2.47	2.47
	0.1	5.2	5.18	5.17	5.17	5.16	5.15	5.14	5.14	5.14	5.13
	0.05	8.7	8.66	8.63	8.62	8.59	8.58	8.55	8.54	8.53	8.53
	0.025	14.3	14.2	14.1	14.1	14	14	14	13.9	13.9	13.9
4	0.01	26.9	26.7	26.6	26.5	26.4	26.4	26.2	26.2	26.1	26.1
	0.005	43.1	42.8	42.6	42.5	42.3	42.2	42	41.9	41.9	41.8
	0.001	127	126	126	125	125	125	124	124	124	123
	0.25	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08
	0.1	3.87	3.84	3.83	3.82	3.8	3.8	3.78	3.77	3.76	3.76
	0.05	5.86	5.8	5.77	5.75	5.72	5.7	5.66	5.65	5.64	5.63
5	0.025	8.66	8.56	8.5	8.46	8.41	8.38	8.32	8.29	8.27	8.26
	0.01	14.2	14	13.9	13.8	13.7	13.7	13.6	13.5	13.5	13.5
	0.005	20.4	20.2	20	19.9	19.8	19.7	19.5	19.4	19.4	19.3
	0.001	46.8	46.1	45.7	45.4	45.1	44.9	44.5	44.3	44.1	44.1
	0.25	1.89	1.88	1.88	1.88	1.88	1.88	1.87	1.87	1.87	1.87
	0.1	3.24	3.21	3.19	3.17	3.16	3.15	3.13	3.12	3.11	3.1
6	0.05	4.62	4.56	4.52	4.5	4.46	4.44	4.41	4.39	4.37	4.36
	0.025	6.43	6.33	6.27	6.23	6.18	6.14	6.08	6.05	6.03	6.02
	0.01	9.72	9.55	9.45	9.38	9.29	9.24	9.13	9.08	9.04	9.02
	0.005	13.1	12.9	12.8	12.7	12.5	12.5	12.3	12.2	12.2	12.1
	0.001	25.9	25.4	25.1	24.9	24.6	24.4	24.1	24	23.9	23.8
	0.25	1.76	1.76	1.75	1.75	1.75	1.75	1.74	1.74	1.74	1.74
8	0.1	2.87	2.84	2.81	2.8	2.78	2.77	2.75	2.73	2.73	2.72
	0.05	3.94	3.87	3.83	3.81	3.77	3.75	3.71	3.69	3.68	3.67
	0.025	5.27	5.17	5.11	5.07	5.01	4.98	4.92	4.88	4.86	4.85
	0.01	7.56	7.4	7.3	7.23	7.14	7.09	6.99	6.93	6.9	6.88
	0.005	9.81	9.59	9.45	9.36	9.24	9.17	9.03	8.95	8.91	8.88
	0.001	17.6	17.1	16.9	16.7	16.4	16.3	16	15.9	15.8	15.7
10	0.25	1.62	1.61	1.6	1.6	1.59	1.59	1.58	1.58	1.58	1.58
	0.1	2.46	2.42	2.4	2.38	2.36	2.35	2.32	2.31	2.3	2.29
	0.05	3.22	3.15	3.11	3.08	3.04	3.02	2.97	2.95	2.94	2.93
	0.025	4.1	4	3.94	3.89	3.84	3.81	3.74	3.7	3.68	3.67
	0.01	5.52	5.36	5.26	5.2	5.12	5.07	4.96	4.91	4.88	4.86
	0.005	6.81	6.61	6.48	6.4	6.29	6.22	6.09	6.02	5.98	5.95
10	0.001	10.8	10.5	10.3	10.1	9.92	9.8	9.57	9.45	9.38	9.33
	0.25	1.53	1.52	1.52	1.51	1.51	1.5	1.49	1.49	1.49	1.48
	0.1	2.24	2.2	2.17	2.16	2.13	2.12	2.09	2.07	2.06	2.06
	0.05	2.85	2.77	2.73	2.7	2.66	2.64	2.59	2.56	2.55	2.54
	0.025	3.52	3.42	3.35	3.31	3.26	3.22	3.15	3.12	3.09	3.08
	0.01	4.56	4.41	4.31	4.25	4.17	4.12	4.01	3.96	3.93	3.91
10	0.005	5.47	5.27	5.15	5.07	4.97	4.9	4.77	4.71	4.67	4.64
	0.001	8.13	7.8	7.6	7.47	7.3	7.19	6.98	6.87	6.81	6.76

Table A7, continued. F-distribution

$\nu_2$ , denom. d.f.	$\alpha$	$\nu_1$ , numerator degrees of freedom									
		1	2	3	4	5	6	7	8	9	10
15	0.25	1.43	1.52	1.52	1.51	1.49	1.48	1.47	1.46	1.46	1.45
	0.1	3.07	2.7	2.49	2.36	2.27	2.21	2.16	2.12	2.09	2.06
	0.05	4.54	3.68	3.29	3.06	2.9	2.79	2.71	2.64	2.59	2.54
	0.025	6.2	4.77	4.15	3.8	3.58	3.41	3.29	3.2	3.12	3.06
	0.01	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4	3.89	3.8
	0.005	10.8	7.7	6.48	5.8	5.37	5.07	4.85	4.67	4.54	4.42
	0.001	16.6	11.3	9.34	8.25	7.57	7.09	6.74	6.47	6.26	6.08
20	0.25	1.4	1.49	1.48	1.47	1.45	1.44	1.43	1.42	1.41	1.4
	0.1	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2	1.96	1.94
	0.05	4.35	3.49	3.1	2.87	2.71	2.6	2.51	2.45	2.39	2.35
	0.025	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91	2.84	2.77
	0.01	8.1	5.85	4.94	4.43	4.1	3.87	3.7	3.56	3.46	3.37
	0.005	9.94	6.99	5.82	5.17	4.76	4.47	4.26	4.09	3.96	3.85
	0.001	14.8	9.95	8.1	7.1	6.46	6.02	5.69	5.44	5.24	5.08
25	0.25	1.39	1.47	1.46	1.44	1.42	1.41	1.4	1.39	1.38	1.37
	0.1	2.92	2.53	2.32	2.18	2.09	2.02	1.97	1.93	1.89	1.87
	0.05	4.24	3.39	2.99	2.76	2.6	2.49	2.4	2.34	2.28	2.24
	0.025	5.69	4.29	3.69	3.35	3.13	2.97	2.85	2.75	2.68	2.61
	0.01	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13
	0.005	9.48	6.6	5.46	4.84	4.43	4.15	3.94	3.78	3.64	3.54
	0.001	13.9	9.22	7.45	6.49	5.89	5.46	5.15	4.91	4.71	4.56
30	0.25	1.38	1.45	1.44	1.42	1.41	1.39	1.38	1.37	1.36	1.35
	0.1	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85	1.82
	0.05	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16
	0.025	5.57	4.18	3.59	3.25	3.03	2.87	2.75	2.65	2.57	2.51
	0.01	7.56	5.39	4.51	4.02	3.7	3.47	3.3	3.17	3.07	2.98
	0.005	9.18	6.35	5.24	4.62	4.23	3.95	3.74	3.58	3.45	3.34
	0.001	13.3	8.77	7.05	6.12	5.53	5.12	4.82	4.58	4.39	4.24
40	0.25	1.36	1.44	1.42	1.4	1.39	1.37	1.36	1.35	1.34	1.33
	0.1	2.84	2.44	2.23	2.09	2	1.93	1.87	1.83	1.79	1.76
	0.05	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08
	0.025	5.42	4.05	3.46	3.13	2.9	2.74	2.62	2.53	2.45	2.39
	0.01	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.8
	0.005	8.83	6.07	4.98	4.37	3.99	3.71	3.51	3.35	3.22	3.12
	0.001	12.6	8.25	6.59	5.7	5.13	4.73	4.44	4.21	4.02	3.87
50	0.25	1.35	1.43	1.41	1.39	1.37	1.36	1.34	1.33	1.32	1.31
	0.1	2.81	2.41	2.2	2.06	1.97	1.9	1.84	1.8	1.76	1.73
	0.05	4.03	3.18	2.79	2.56	2.4	2.29	2.2	2.13	2.07	2.03
	0.025	5.34	3.97	3.39	3.05	2.83	2.67	2.55	2.46	2.38	2.32
	0.01	7.17	5.06	4.2	3.72	3.41	3.19	3.02	2.89	2.78	2.7
	0.005	8.63	5.9	4.83	4.23	3.85	3.58	3.38	3.22	3.09	2.99
	0.001	12.2	7.96	6.34	5.46	4.9	4.51	4.22	4	3.82	3.67
100	0.25	1.34	1.41	1.39	1.37	1.35	1.33	1.32	1.3	1.29	1.28
	0.1	2.76	2.36	2.14	2	1.91	1.83	1.78	1.73	1.69	1.66
	0.05	3.94	3.09	2.7	2.46	2.31	2.19	2.1	2.03	1.97	1.93
	0.025	5.18	3.83	3.25	2.92	2.7	2.54	2.42	2.32	2.24	2.18
	0.01	6.9	4.82	3.98	3.51	3.21	2.99	2.82	2.69	2.59	2.5
	0.005	8.24	5.59	4.54	3.96	3.59	3.33	3.13	2.97	2.85	2.74
	0.001	11.5	7.41	5.86	5.02	4.48	4.11	3.83	3.61	3.44	3.3
200	0.25	1.33	1.4	1.38	1.36	1.34	1.32	1.3	1.29	1.28	1.27
	0.1	2.73	2.33	2.11	1.97	1.88	1.8	1.75	1.7	1.66	1.63
	0.05	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98	1.93	1.88
	0.025	5.1	3.76	3.18	2.85	2.63	2.47	2.35	2.26	2.18	2.11
	0.01	6.76	4.71	3.88	3.41	3.11	2.89	2.73	2.6	2.5	2.41
	0.005	8.06	5.44	4.41	3.84	3.47	3.21	3.01	2.86	2.73	2.63
	0.001	11.2	7.15	5.63	4.81	4.29	3.92	3.65	3.43	3.26	3.12
$\infty$	0.25	1.32	1.39	1.37	1.35	1.33	1.31	1.29	1.28	1.27	1.25
	0.1	2.71	2.3	2.08	1.94	1.85	1.77	1.72	1.67	1.63	1.6
	0.05	3.84	3	2.6	2.37	2.21	2.1	2.01	1.94	1.88	1.83
	0.025	5.02	3.69	3.12	2.79	2.57	2.41	2.29	2.19	2.11	2.05
	0.01	6.63	4.61	3.78	3.32	3.02	2.8	2.64	2.51	2.41	2.32
	0.005	7.88	5.3	4.28	3.72	3.35	3.09	2.9	2.74	2.62	2.52
	0.001	10.8	6.91	5.42	4.62	4.1	3.74	3.47	3.27	3.1	2.96

Table A7, continued. F-distribution

$\nu_2$ , denom. d.f.	$\alpha$	$\nu_1$ , numerator degrees of freedom									
		15	20	25	30	40	50	100	200	500	$\infty$
15	0.25	1.43	1.41	1.4	1.4	1.39	1.38	1.37	1.37	1.36	1.36
	0.1	1.97	1.92	1.89	1.87	1.85	1.83	1.79	1.77	1.76	1.76
	0.05	2.4	2.33	2.28	2.25	2.2	2.18	2.12	2.1	2.08	2.07
	0.025	2.86	2.76	2.69	2.64	2.59	2.55	2.47	2.44	2.41	2.4
	0.01	3.52	3.37	3.28	3.21	3.13	3.08	2.98	2.92	2.89	2.87
	0.005	4.07	3.88	3.77	3.69	3.58	3.52	3.39	3.33	3.29	3.26
	0.001	5.54	5.25	5.07	4.95	4.8	4.7	4.51	4.41	4.35	4.31
20	0.25	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.3	1.3	1.29
	0.1	1.84	1.79	1.76	1.74	1.71	1.69	1.65	1.63	1.62	1.61
	0.05	2.2	2.12	2.07	2.04	1.99	1.97	1.91	1.88	1.86	1.84
	0.025	2.57	2.46	2.4	2.35	2.29	2.25	2.17	2.13	2.1	2.09
	0.01	3.09	2.94	2.84	2.78	2.69	2.64	2.54	2.48	2.44	2.42
	0.005	3.5	3.32	3.2	3.12	3.02	2.96	2.83	2.76	2.72	2.69
	0.001	4.56	4.29	4.12	4	3.86	3.77	3.58	3.48	3.42	3.38
25	0.25	1.34	1.33	1.31	1.31	1.29	1.29	1.27	1.26	1.26	1.25
	0.1	1.77	1.72	1.68	1.66	1.63	1.61	1.56	1.54	1.53	1.52
	0.05	2.09	2.01	1.96	1.92	1.87	1.84	1.78	1.75	1.73	1.71
	0.025	2.41	2.3	2.23	2.18	2.12	2.08	2	1.95	1.92	1.91
	0.01	2.85	2.7	2.6	2.54	2.45	2.4	2.29	2.23	2.19	2.17
	0.005	3.2	3.01	2.9	2.82	2.72	2.65	2.52	2.45	2.41	2.38
	0.001	4.06	3.79	3.63	3.52	3.37	3.28	3.09	2.99	2.93	2.89
30	0.25	1.32	1.3	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.23
	0.1	1.72	1.67	1.63	1.61	1.57	1.55	1.51	1.48	1.47	1.46
	0.05	2.01	1.93	1.88	1.84	1.79	1.76	1.7	1.66	1.64	1.62
	0.025	2.31	2.2	2.12	2.07	2.01	1.97	1.88	1.84	1.81	1.79
	0.01	2.7	2.55	2.45	2.39	2.3	2.25	2.13	2.07	2.03	2.01
	0.005	3.01	2.82	2.71	2.63	2.52	2.46	2.32	2.25	2.21	2.18
	0.001	3.75	3.49	3.33	3.22	3.07	2.98	2.79	2.69	2.63	2.59
40	0.25	1.3	1.28	1.26	1.25	1.24	1.23	1.21	1.2	1.19	1.19
	0.1	1.66	1.61	1.57	1.54	1.51	1.48	1.43	1.41	1.39	1.38
	0.05	1.92	1.84	1.78	1.74	1.69	1.66	1.59	1.55	1.53	1.51
	0.025	2.18	2.07	1.99	1.94	1.88	1.83	1.74	1.69	1.66	1.64
	0.01	2.52	2.37	2.27	2.2	2.11	2.06	1.94	1.87	1.83	1.8
	0.005	2.78	2.6	2.48	2.4	2.3	2.23	2.09	2.01	1.96	1.93
	0.001	3.4	3.14	2.98	2.87	2.73	2.64	2.44	2.34	2.28	2.23
50	0.25	1.28	1.26	1.25	1.23	1.22	1.21	1.19	1.18	1.17	1.16
	0.1	1.63	1.57	1.53	1.5	1.46	1.44	1.39	1.36	1.34	1.33
	0.05	1.87	1.78	1.73	1.69	1.63	1.6	1.52	1.48	1.46	1.44
	0.025	2.11	1.99	1.92	1.87	1.8	1.75	1.66	1.6	1.57	1.55
	0.01	2.42	2.27	2.17	2.1	2.01	1.95	1.82	1.76	1.71	1.68
	0.005	2.65	2.47	2.35	2.27	2.16	2.1	1.95	1.87	1.82	1.79
	0.001	3.2	2.95	2.79	2.68	2.53	2.44	2.25	2.14	2.07	2.03
100	0.25	1.25	1.23	1.21	1.2	1.18	1.17	1.14	1.13	1.12	1.11
	0.1	1.56	1.49	1.45	1.42	1.38	1.35	1.29	1.26	1.23	1.21
	0.05	1.77	1.68	1.62	1.57	1.52	1.48	1.39	1.34	1.31	1.28
	0.025	1.97	1.85	1.77	1.71	1.64	1.59	1.48	1.42	1.38	1.35
	0.01	2.22	2.07	1.97	1.89	1.8	1.74	1.6	1.52	1.47	1.43
	0.005	2.41	2.23	2.11	2.02	1.91	1.84	1.68	1.59	1.53	1.49
	0.001	2.84	2.59	2.43	2.32	2.17	2.08	1.87	1.75	1.67	1.62
200	0.25	1.23	1.21	1.19	1.18	1.16	1.15	1.12	1.1	1.09	1.07
	0.1	1.52	1.46	1.41	1.38	1.34	1.31	1.24	1.2	1.17	1.14
	0.05	1.72	1.62	1.56	1.52	1.46	1.41	1.32	1.26	1.22	1.19
	0.025	1.9	1.78	1.7	1.64	1.56	1.51	1.39	1.32	1.27	1.23
	0.01	2.13	1.97	1.87	1.79	1.69	1.63	1.48	1.39	1.33	1.28
	0.005	2.3	2.11	1.99	1.91	1.79	1.71	1.54	1.44	1.37	1.31
	0.001	2.67	2.42	2.26	2.15	2	1.9	1.68	1.55	1.46	1.39
$\infty$	0.25	1.22	1.19	1.17	1.16	1.14	1.13	1.09	1.07	1.04	Undefined
	0.1	1.49	1.42	1.38	1.34	1.3	1.26	1.18	1.13	1.08	
	0.05	1.67	1.57	1.51	1.46	1.39	1.35	1.24	1.17	1.11	
	0.025	1.83	1.71	1.63	1.57	1.48	1.43	1.3	1.21	1.13	
	0.01	2.04	1.88	1.77	1.7	1.59	1.52	1.36	1.25	1.15	
	0.005	2.19	2	1.88	1.79	1.67	1.59	1.4	1.28	1.17	
	0.001	2.51	2.27	2.1	1.99	1.84	1.73	1.49	1.34	1.21	

**Table A8. Table of Critical Values for the Wilcoxon Signed Rank Test**

For the left-tail test, the table gives the largest integer  $w$  such that  $\mathbf{P}\{W \leq w \mid H_0\} \leq \alpha$ .

For the right-tail test, the table gives the smallest integer  $w$  such that  $\mathbf{P}\{W \geq w \mid H_0\} \leq \alpha$ .

A missing table entry means that such an integer does not exist among possible values of  $W$ .

$n$	$\alpha$ , left-tail probability for the left-tail test							$\alpha$ , right-tail probability for the right-tail test						
	0.001	0.005	0.010	0.025	0.050	0.100	0.200	0.200	0.100	0.050	0.025	0.010	0.005	0.001
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	—	—	—	—	—	—	0	6	—	—	—	—	—	—
4	—	—	—	—	—	0	2	8	10	—	—	—	—	—
5	—	—	—	—	0	2	3	12	13	15	—	—	—	—
6	—	—	—	0	2	3	5	16	18	19	21	—	—	—
7	—	—	0	2	3	5	8	20	23	25	26	28	—	—
8	—	0	1	3	5	8	11	25	28	31	33	35	36	—
9	—	1	3	5	8	10	14	31	35	37	40	42	44	—
10	0	3	5	8	10	14	18	37	41	45	47	50	52	55
11	1	5	7	10	13	17	22	44	49	53	56	59	61	65
12	2	7	9	13	17	21	27	51	57	61	65	69	71	76
13	4	9	12	17	21	26	32	59	65	70	74	79	82	87
14	6	12	15	21	25	31	38	67	74	80	84	90	93	99
15	8	15	19	25	30	36	44	76	84	90	95	101	105	112
16	11	19	23	29	35	42	50	86	94	101	107	113	117	125
17	14	23	27	34	41	48	57	96	105	112	119	126	130	139
18	18	27	32	40	47	55	65	106	116	124	131	139	144	153
19	21	32	37	46	53	62	73	117	128	137	144	153	158	169
20	26	37	43	52	60	69	81	129	141	150	158	167	173	184
21	30	42	49	58	67	77	90	141	154	164	173	182	189	201
22	35	48	55	65	75	86	99	154	167	178	188	198	205	218
23	40	54	62	73	83	94	109	167	182	193	203	214	222	236
24	45	61	69	81	91	104	119	181	196	209	219	231	239	255
25	51	68	76	89	100	113	130	195	212	225	236	249	257	274
26	58	75	84	98	110	124	141	210	227	241	253	267	276	293
27	64	83	92	107	119	134	153	225	244	259	271	286	295	314
28	71	91	101	116	130	145	165	241	261	276	290	305	315	335
29	79	100	110	126	140	157	177	258	278	295	309	325	335	356
30	86	109	120	137	151	169	190	275	296	314	328	345	356	379

**Table A9. Critical Values for the Mann-Whitney-Wilcoxon Rank-Sum Test**

For the left-tail test, the table gives the largest integer  $u$  such that  $\mathbf{P}\{U \leq u \mid H_0\} \leq \alpha$ .

For the right-tail test, the table gives the smallest integer  $u$  such that  $\mathbf{P}\{U \geq u \mid H_0\} \leq \alpha$ .

A missing table entry means that such an integer does not exist among possible values of  $U$ .

$n_1$	$n_2$	$\alpha$ , left-tail probability for the left-tail test $H_A : X$ is stochastically smaller than $Y$							$\alpha$ , right-tail probability for the right-tail test $H_A : X$ is stochastically larger than $Y$						
		0.001	0.005	0.010	0.025	0.050	0.100	0.200	0.200	0.100	0.050	0.025	0.010	0.005	0.001
3	2	—	—	—	—	—	6	7	11	12	—	—	—	—	—
3	3	—	—	—	—	—	6	7	13	14	15	—	—	—	—
3	4	—	—	—	—	—	6	7	15	17	18	—	—	—	—
3	5	—	—	—	6	7	8	10	17	19	20	21	—	—	—
3	6	—	—	—	7	8	9	11	19	21	22	23	—	—	—
3	7	—	—	6	7	8	10	12	21	23	25	26	27	—	—
3	8	—	—	6	8	9	11	13	23	25	27	28	30	—	—
3	9	—	6	7	8	10	11	14	25	28	29	31	32	33	—
3	10	—	6	7	9	10	12	15	27	30	32	33	35	36	—
3	11	—	6	7	9	11	13	16	29	32	34	36	38	39	—
3	12	—	7	8	10	11	14	17	31	34	37	38	40	41	—
4	2	—	—	—	—	—	10	11	17	18	—	—	—	—	—
4	3	—	—	—	—	10	11	13	19	21	22	—	—	—	—
4	4	—	—	—	10	11	13	14	22	23	25	26	—	—	—
4	5	—	—	10	11	12	14	15	25	26	28	29	30	—	—
4	6	—	10	11	12	13	15	17	27	29	31	32	33	34	—
4	7	—	10	11	13	14	16	18	30	32	34	35	37	38	—
4	8	—	11	12	14	15	17	20	32	35	37	38	40	41	—
4	9	—	11	13	14	16	19	21	35	37	40	42	43	45	—
4	10	10	12	13	15	17	20	23	37	40	43	45	47	48	50
4	11	10	12	14	16	18	21	24	40	43	46	48	50	52	54
4	12	10	13	15	17	19	22	26	42	46	49	51	53	55	58
5	2	—	—	—	—	15	16	17	23	24	25	—	—	—	—
5	3	—	—	—	15	16	17	19	26	28	29	30	—	—	—
5	4	—	—	15	16	17	19	20	30	31	33	34	35	—	—
5	5	—	15	16	17	19	20	22	33	35	36	38	39	40	—
5	6	—	16	17	18	20	22	24	36	38	40	42	43	44	—
5	7	—	16	18	20	21	23	26	39	42	44	45	47	49	—
5	8	15	17	19	21	23	25	28	42	45	47	49	51	53	55
5	9	16	18	20	22	24	27	30	45	48	51	53	55	57	59
5	10	16	19	21	23	26	28	32	48	52	54	57	59	61	64
5	11	17	20	22	24	27	30	34	51	55	58	61	63	65	68
5	12	17	21	23	26	28	32	36	54	58	62	64	67	69	73
6	2	—	—	—	—	21	22	23	31	32	33	—	—	—	—
6	3	—	—	—	22	23	24	26	34	36	37	38	—	—	—
6	4	—	21	22	23	24	26	28	38	40	42	43	44	45	—
6	5	—	22	23	24	26	28	30	42	44	46	48	49	50	—
6	6	—	23	24	26	28	30	33	45	48	50	52	54	55	—
6	7	21	24	25	27	29	32	35	49	52	55	57	59	60	63
6	8	22	25	27	29	31	34	37	53	56	59	61	63	65	68
6	9	23	26	28	31	33	36	40	56	60	63	65	68	70	73
6	10	24	27	29	32	35	38	42	60	64	67	70	73	75	78
6	11	25	28	30	34	37	40	44	64	68	71	74	78	80	83
6	12	25	30	32	35	38	42	47	67	72	76	79	82	84	89
7	2	—	—	—	—	28	29	31	39	41	42	—	—	—	—
7	3	—	—	28	29	30	32	34	43	45	47	48	49	—	—
7	4	—	28	29	31	32	34	36	48	50	52	53	55	56	—
7	5	—	29	31	33	34	36	39	52	55	57	58	60	62	—
7	6	28	31	32	34	36	39	42	56	59	62	64	66	67	70
7	7	29	32	34	36	39	41	45	60	64	66	69	71	73	76
7	8	30	34	35	38	41	44	48	64	68	71	74	77	78	82
7	9	31	35	37	40	43	46	50	69	73	76	79	82	84	88
7	10	33	37	39	42	45	49	53	73	77	81	84	87	89	93
7	11	34	38	40	44	47	51	56	77	82	86	89	93	95	99
7	12	35	40	42	46	49	54	59	81	86	91	94	98	100	105



**Table A9, continued. Critical Values for the Mann-Whitney-Wilcoxon Rank-Sum Test**

For the left-tail test, the table gives the largest integer  $u$  such that  $\mathbf{P}\{U \leq u \mid H_0\} \leq \alpha$ .

For the right-tail test, the table gives the smallest integer  $u$  such that  $\mathbf{P}\{U \geq u \mid H_0\} \leq \alpha$ .

A missing table entry means that such an integer does not exist among possible values of  $U$ .

$n_1$	$n_2$	$\alpha$ , left-tail probability for the left-tail test $H_A : X$ is stochastically smaller than $Y$							$\alpha$ , right-tail probability for the right-tail test $H_A : X$ is stochastically larger than $Y$						
		0.001	0.005	0.010	0.025	0.050	0.100	0.200	0.200	0.100	0.050	0.025	0.010	0.005	0.001
8	2	—	—	—	36	37	38	40	48	50	51	52	—	—	—
8	3	—	—	36	38	39	41	43	53	55	57	58	60	—	—
8	4	—	37	38	40	41	43	46	58	61	63	64	66	67	—
8	5	36	38	40	42	44	46	49	63	66	68	70	72	74	76
8	6	37	40	42	44	46	49	52	68	71	74	76	78	80	83
8	7	38	42	43	46	49	52	56	72	76	79	82	85	86	90
8	8	40	43	45	49	51	55	59	77	81	85	87	91	93	96
8	9	41	45	47	51	54	58	62	82	86	90	93	97	99	103
8	10	42	47	49	53	56	60	65	87	92	96	99	103	105	110
8	11	44	49	51	55	59	63	69	91	97	101	105	109	111	116
8	12	45	51	53	58	62	66	72	96	102	106	110	115	117	123
9	2	—	—	—	45	46	47	49	59	61	62	63	—	—	—
9	3	—	45	46	47	49	50	53	64	67	68	70	71	72	—
9	4	—	46	48	49	51	54	56	70	72	75	77	78	80	—
9	5	46	48	50	52	54	57	60	75	78	81	83	85	87	89
9	6	47	50	52	55	57	60	64	80	84	87	89	92	94	97
9	7	48	52	54	57	60	63	67	86	90	93	96	99	101	105
9	8	50	54	56	60	63	67	71	91	95	99	102	106	108	112
9	9	52	56	59	62	66	70	75	96	101	105	109	112	115	119
9	10	53	58	61	65	69	73	78	102	107	111	115	119	122	127
9	11	55	61	63	68	72	76	82	107	113	117	121	126	128	134
9	12	57	63	66	71	75	80	86	112	118	123	127	132	135	141
10	2	—	—	—	55	56	58	60	70	72	74	75	—	—	—
10	3	—	55	56	58	59	61	64	76	79	81	82	84	85	—
10	4	55	57	58	60	62	65	68	82	85	88	90	92	93	95
10	5	56	59	61	63	66	68	72	88	92	94	97	99	101	104
10	6	58	61	63	66	69	72	76	94	98	101	104	107	109	112
10	7	60	64	66	69	72	76	80	100	104	108	111	114	116	120
10	8	61	66	68	72	75	79	84	106	111	115	118	122	124	129
10	9	63	68	71	75	79	83	88	112	117	121	125	129	132	137
10	10	65	71	74	78	82	87	93	117	123	128	132	136	139	145
10	11	67	73	77	81	86	91	97	123	129	134	139	143	147	153
10	12	69	76	79	84	89	94	101	129	136	141	146	151	154	161
11	2	—	—	—	66	67	69	71	83	85	87	88	—	—	—
11	3	—	66	67	69	71	73	76	89	92	94	96	98	99	—
11	4	66	68	70	72	74	77	80	96	99	102	104	106	108	110
11	5	68	71	73	75	78	81	85	102	106	109	112	114	116	119
11	6	70	73	75	79	82	85	89	109	113	116	119	123	125	128
11	7	72	76	78	82	85	89	94	115	120	124	127	131	133	137
11	8	74	79	81	85	89	93	99	121	127	131	135	139	141	146
11	9	76	82	84	89	93	97	103	128	134	138	142	147	149	155
11	10	78	84	88	92	97	102	108	134	140	145	150	154	158	164
11	11	81	87	91	96	100	106	112	141	147	153	157	162	166	172
11	12	83	90	94	99	104	110	117	147	154	160	165	170	174	181
12	2	—	—	—	79	80	82	84	96	98	100	101	—	—	—
12	3	—	79	80	82	83	86	89	103	106	109	110	112	113	—
12	4	78	81	83	85	87	90	94	110	114	117	119	121	123	126
12	5	80	84	86	89	91	95	99	117	121	125	127	130	132	136
12	6	82	87	89	92	95	99	104	124	129	133	136	139	141	146
12	7	85	90	92	96	99	104	109	131	136	141	144	148	150	155
12	8	87	93	95	100	104	108	114	138	144	148	152	157	159	165
12	9	90	96	99	104	108	113	119	145	151	156	160	165	168	174
12	10	92	99	102	107	112	117	124	152	159	164	169	174	177	184
12	11	95	102	106	111	116	122	129	159	166	172	177	182	186	193
12	12	98	105	109	115	120	127	134	166	173	180	185	191	195	202