Appendix 1 Statistical tables

Table A1 Random digits

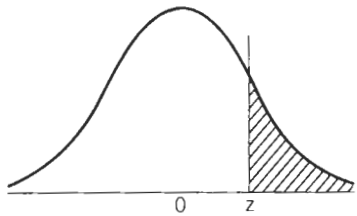
49487	52802	28667	62058	87822	14704	18519	17889	45869	14454
29480	91539	46317	84803	86056	62812	33584	70391	77749	64906
25252	97738	23901	11106	86864	55808	22557	23214	15021	54268
02431	42193	96960	19620	29188	05863	92900	06836	13433	21709
69414	89353	70724	67893	23218	72452	03095	68333	13751	37260
77285	35179	92042	67581	67673	68374	71115	98166	43352	06414
52852	11444	71863	34534	69124	02760	06406	95234	87995	79560
98740	98054	30195	09891	18453	79464	01156	95522	06884	55073
85022	58736	12138	35146	62085	36170	25433	80787	96496	40579
17778	03840	21636	56269	08149	19001	67367	13138	02400	89515
81833	93449	57781	94621	90998	37561	59688	93299	27726	82167
63789	54958	33167	10909	40343	81023	61590	44474	39810	10305
61640	81740	60986	12498	71546	42249	13812	59902	27864	21809
42243	10153	20891	90883	15782	98167	86837	99166	92143	82441
45236	09129	53031	12260	01278	14404	40969	33419	14188	69557
40338	42477	78804	36272	72053	07958	67158	60979	79891	92409
54040	71253	88789	98203	54999	96564	00789	68879	47134	83941
49158	20908	44859	29089	76130	51442	34453	98590	37353	61137
80958	03808	83655	18415	96563	43582	82207	53322	30419	64435
07636	04876	61063	57571	69434	14965	20911	73162	33576	52839
37227	80750	08261	97048	60438	75053	05939	34414	16685	32103
99460	45915	45637	41353	35335	69087	57536	68418	10247	93253
60248	75845	37296	33783	42393	28185	31880	00241	31642	37526
95076	79089	87380	28982	97750	82221	35584	27444	85793	69755
20944	97852	26586	32796	51513	47475	48621	20067	88975	39506
30458	49207	62358	41532	30057	53017	10375	97204	98675	77634
38905	91282	79309	49022	17405	18830	09186	07629	01785	78317
96545	15638	90114	93730	13741	70177	49175	42113	21600	69625
21944	28328	00692	89164	96025	01383	50252	67044	70596	58266
36910	71928	63327	00980	32154	46006	62289	28079	03076	15619
48745	47626	28856	28382	60639	51370	70091	58261	70135	88259
32519	91993	59374	83994	59873	51217	62806	20028	26545	16820
75757	12965	29285	11481	31744	41754	24428	81819	02354	37895
07911	97756	89561	27464	25133	50026	16436	75846	83718	08533
89887	03328	76911	93168	56236	39056	67905	94933	05456	52347
30543	99488	75363	94187	32885	23887	10872	22793	26232	87356
68442	55201	33946	42495	28384	89889	50278	91985	58185	19124
22403	56698	88524	13692	55012	25343	76391	48029	72278	58586
70701	36907	51242	52083	43126	90379	60380	98513	85596	16528
69804	96122	42342	28467	79037	13218	63510	09071	52438	25840
65806	22398	19470	63653	27055	02606	43347	65384	02613	81668
43902	53070	54319	19347	59506	75440	90826	53652	92382	67623
49145	71587	14273	62440	15770	03281	58124	09533	43722	03856
47363	36295	62126	42358	20322	82000	52830	93540	13284	96496
26244	87033	90247	79131	38773	67687	45541	54976	17508	18367
72875	39496	06385	48458	30545	74383	22814	36752	10707	48774
09065	16283	61398	08288	00708	21816	39615	03102	02834	04116
68256	51225	92645	77747	33104	81206	00112	53445	04212	58476
38744	81018	41909	70458	72459	66136	97266	26490	10877	45022
44375	19619	35750	59924	82429	90288	61064	26489	87001	84273

Table A1 (continued)

57780	97609	52482	12783	88768	12323	64967	22970	11204	37576
68327	00067	17487	49149	25894	23639	86557	04139	10756	76285
55888	82253	67464	91628	88764	43598	45481	00331	15900	97699
84910	44827	31173	44247	56573	91759	79931	26644	27048	53704
35654	53638	00563	57230	07395	10813	99194	81592	96834	21374
46381	60071	20835	43110	31842	02855	73446	24456	24268	85291
11212	06034	77313	66896	47902	63483	09924	83635	30013	61791
49703	07226	73337	49223	73312	09534	64005	79267	76590	26066
05482	30340	24606	99042	16536	14267	84084	16198	94852	44305
92947	65090	47455	90675	89921	13036	92867	04786	76776	18675
51806	61445	32437	01129	03644	70024	07629	55805	85616	59569
16383	30577	91319	67998	72423	81307	75192	80443	09651	30068
30893	85406	42369	71836	74479	68273	78133	34506	68711	58725
59790	11682	63156	10443	99033	76460	36814	36917	37232	66218
06271	74980	46094	21881	43525	16516	26393	89082	24343	57546
93325	61834	40763	81178	17507	90432	50973	35591	36930	03184
46690	08927	32962	24882	83156	58597	88267	32479	80440	41668
82041	88942	57572	34539	43812	58483	43779	42718	46798	49079
14306	04003	91186	70093	62700	99408	72236	52722	37531	24590
63471	77583	80056	59027	37031	05819	90836	19530	07138	36431
68467	17634	84211	31776	92996	75644	82043	84157	10877	12536
94308	57895	08121	07088	65080	51928	74237	00449	86625	06626
52218	32502	82195	43867	79935	34620	37386	00243	46353	44499
46586	08309	52702	85464	06670	18796	74713	81632	34056	56461
07869	80471	69139	82408	33989	44250	79597	15182	14956	70423
46719	60281	88638	26909	32415	31864	53708	60219	44482	40004
74687	71227	59716	80619	56816	73807	94150	21991	22901	74351
42731	50249	11685	54034	12710	35159	00214	19440	61539	25717
71740	29429	86822	01187	96497	25823	18415	06087	05886	11205
96746	05938	11828	47727	02522	33147	92846	15010	96725	67903
27564	81744	51909	36192	45263	33212	71808	24753	72644	74441
21895	29683	26533	14740	94286	90342	24674	52762	22051	31743
01492	40778	05988	65760	13468	31132	37106	02723	40202	15824
55846	19271	22846	80425	00235	34292	72181	24910	25245	81239
14615	75196	40313	50783	66585	39010	76796	31385	26785	66830
77848	15755	91938	81915	65312	86956	26195	61525	97406	67988
87167	03106	52876	31670	23850	13257	77510	42393	53782	32412
73018	56511	89388	73133	12074	62538	57215	23476	92150	14737
29247	67792	10593	22772	03407	24319	19525	24672	21182	10765
17412	09161	34905	44524	20124	85151	25952	81930	43536	39705
68805	19830	87973	99691	25096	41497	57562	35553	77057	06161
40551	36740	61851	76158	35441	66188	87728	66375	98049	84604
90379	06314	21897	42800	63963	44258	14381	90884	66620	14538
09466	65311	95514	51559	29960	07521	42180	86677	94240	59783
15821	25078	19388	93798	50820	88254	20504	74158	35756	42100
10328	60890	05204	30069	79630	31572	63273	13703	52954	72793
49727	08160	81650	71690	56327	06729	22495	49756	43333	34533
71118	41798	34541	76432	40522	51521	74382	06305	11956	30611
53253	23100	03743	48999	37736	92186	19108	69017	21661	17175
12206	24205	32372	46438	67981	53226	24943	68659	91924	69555

Table A2 The normal distribution

The table gives the proportion of the total area under the curve which lies beyond any given z value (that is, the shaded area in the diagram). It is therefore appropriate for a one-tailed (directional) test. For a two-tailed (non-directional) test, the proportions must be doubled.



The figures down the left-hand side give values of z to the first decimal place, and those across the top give the second decimal place.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
3.5	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002

Table A3 The *t*-distribution

The table gives critical values of t for significance at various levels, in a two-tailed/non-directional or a one-tailed/directional test, for different numbers of degrees of freedom. These critical values are the values beyond which lies that proportion of the area under the curve which corresponds to the significance level.

	Significance level: two-tailed/non-directional				
	0.20	*0.10*	*0.05*	*0.02*	*0.01*
Degrees of freedom	*Significance level: one-tailed/directional*				
	0.10	*0.05*	*0.025*	*0.01*	*0.005*
1	3.078	6.314	12.71	31.82	63.66
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.326	2.576

Table A4 The Mann–Whitney *U*-test

The first table gives the critical values for significance at the $p \leqslant 0.05$ level in a two-tailed/non-directional test, and for the $p \leqslant 0.025$ level in a one-tailed/directional test. The second table gives the critical values for the $p \leqslant 0.01$ level in a two-tailed/non-directional test, and for the $p \leqslant 0.005$ level in a one-tailed/directional test. For significance, the calculated value of U must be *smaller than or equal to* the critical value. N_1 and N_2 are the number of observations in the smaller and larger group, respectively.

	N_2															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
N_1																
$p \leqslant 0.05$ (two-tailed), $p \leqslant 0.025$ (one-tailed)																
5	2	3	5	6	7	8	9	11	12	13	14	15	17	18	19	20
6		5	6	8	10	11	13	14	16	17	19	21	22	24	25	27
7			8	10	12	14	16	18	20	22	24	26	28	30	32	34
8				13	15	17	19	22	24	26	29	31	34	36	38	41
9					17	20	23	26	28	31	34	37	39	42	45	48
10						23	26	29	33	36	39	42	45	48	52	55
11							30	33	37	40	44	47	51	55	58	62
12								37	41	45	49	53	57	61	65	69
13									45	50	54	59	63	67	72	76
14										55	59	64	69	74	78	83
15											64	70	75	80	85	90
16												75	81	86	92	98
17													87	93	99	105
18														99	106	112
19															113	119
20																127
$p \leqslant 0.01$ (two-tailed), $p \leqslant 0.005$ (one-tailed)																
5	0	1	1	2	3	4	5	6	7	7	8	9	10	11	12	13
6		2	3	4	5	6	7	9	10	11	12	13	15	16	17	18
7			4	6	7	9	10	12	13	15	16	18	19	21	22	24
8				7	9	11	13	15	17	18	20	22	24	26	28	30
9					11	13	16	18	20	22	24	27	29	31	33	36
10						16	18	21	24	26	29	31	34	37	39	42
11							21	24	27	30	33	36	39	42	45	48
12								27	31	34	37	41	44	47	51	54
13									34	38	42	45	49	53	57	60
14										42	46	50	54	58	63	67
15											51	55	60	64	69	73
16												60	65	70	74	79
17													70	75	81	86
18														81	87	92
19															93	99
20																105

Table A5 The Wilcoxon signed-ranks test

The table gives critical values of W for different values of N (the number of non-tied pairs of scores). For significance, the calculated value must be *smaller than or equal to* the critical value.

	Significance level: two-tailed/non-directional	
	0.05	*0.01*
	Significance level: one-tailed/directional	
N	*0.025*	*0.005*
6	0	–
7	2	–
8	3	0
9	5	1
10	8	3
11	10	5
12	13	7
13	17	9
14	21	12
15	25	15
16	29	19
17	34	23
18	40	27
19	46	32
20	52	37
21	58	42
22	65	48
23	73	54
24	81	61
25	89	68

Table A6 The sign test

The table gives critical values of x (the number of cases with the less frequent sign) for different values of N (the number of non-tied pairs of scores). For significance, the computed value of x must be *smaller than or equal to* the critical value.

	Significance level: two-tailed/non-directional		
	0.10	*0.05*	*0.02*
	Significance level: one-tailed/directional		
N	*0.05*	*0.025*	*0.01*
5	0	–	–
6	0	0	–
7	0	0	0
8	1	0	0
9	1	1	0
10	1	1	0
11	2	1	1
12	2	2	1
13	3	2	1
14	3	2	2
15	3	3	2
16	4	3	2
17	4	4	3
18	5	4	3
19	5	4	4
20	5	5	4
21	6	5	4
22	6	5	5
23	7	6	5
24	7	6	5
25	7	7	6

Table A7 The chi-square distribution

The table gives the critical values of χ^2 in a two-tailed/non-directional test, for different numbers of degrees of freedom (df). For significance, the calculated value must be *greater than or equal to* the critical value.

	Significance level					
df	*0.20*	*0.10*	*0.05*	*0.025*	*0.01*	*0.001*
1	1.64	2.71	3.84	5.02	6.64	10.83
2	3.22	4.61	5.99	7.38	9.21	13.82
3	4.64	6.25	7.82	9.35	11.34	16.27
4	5.99	7.78	9.49	11.14	13.28	18.47
5	7.29	9.24	11.07	12.83	15.09	20.52
6	8.56	10.64	12.59	14.45	16.81	22.46
7	9.80	12.02	14.07	16.01	18.48	24.32
8	11.03	13.36	15.51	17.53	20.09	26.12
9	12.24	14.68	16.92	19.02	21.67	27.88
10	13.44	15.99	18.31	20.48	23.21	29.59
11	14.63	17.28	19.68	21.92	24.72	31.26
12	15.81	18.55	21.03	23.34	26.22	32.91
13	16.98	19.81	22.36	24.74	27.69	34.53
14	18.15	21.06	23.68	26.12	29.14	36.12
15	19.31	22.31	25.00	27.49	30.58	37.70
16	20.47	23.54	26.30	28.85	32.00	39.25
17	21.61	24.77	27.59	30.19	33.41	40.79
18	22.76	25.99	28.87	31.53	34.81	42.31
19	23.90	27.20	30.14	32.85	36.19	43.82
20	25.04	28.41	31.41	34.17	37.57	45.31
21	26.17	29.62	32.67	35.48	38.93	46.80
22	27.30	30.81	33.92	36.78	40.29	48.27
23	28.43	32.01	35.17	38.08	41.64	49.73
24	29.55	33.20	36.42	39.36	42.98	51.18
25	30.68	34.38	37.65	40.65	44.31	52.62
26	31.79	35.56	38.89	41.92	45.64	54.05
27	32.91	36.74	40.11	43.19	46.96	55.48
28	34.03	37.92	41.34	44.46	48.28	56.89
29	35.14	39.09	42.56	45.72	49.59	58.30
30	36.25	40.26	43.77	46.98	50.89	59.70
40	47.27	51.81	55.76	59.34	63.69	73.40
50	58.16	63.17	67.50	71.42	76.15	86.66
60	68.97	74.40	79.08	83.30	88.38	99.61
70	79.71	85.53	90.53	95.02	100.4	112.3

Table A8 The F distribution

The table gives the critical values of F for different numbers of degrees of freedom (df) in the numerator and in the denominator of the expression for F. For each entry, two values are given. The upper value is the critical value for the $p \leqslant 0.05$ level in a one-tailed/directional test, and for the $p \leqslant 0.10$ level in a two-tailed/non-directional test. The lower value is the critical value for the $p \leqslant 0.01$ level in a one-tailed/directional test and for the $p \leqslant 0.02$ level in a two-tailed/non-directional test.

Df in denominator	*Df in numerator*															
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*12*	*15*	*20*	*30*	*50*	*∞*
1	161	200	216	225	230	234	237	239	241	242	244	246	248	250	252	254
	4 052	5 000	5 403	5 625	5 764	5 859	5 928	5 981	6 022	6 056	6 106	6 157	6 209	6 261	6 303	6 366
2	18.5	19.0	19.2	19.2	19.3	19.3	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.5	19.5	19.5
	98.5	99.0	99.2	99.2	99.3	99.3	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.5	99.5	99.5
3	10.1	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.62	8.58	8.53
	34.1	30.8	29.5	28.7	28.2	27.9	27.7	27.5	27.3	27.2	27.1	26.9	26.7	26.5	26.4	26.1
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.75	5.70	5.63
	21.2	18.0	16.7	16.0	15.5	15.2	15.0	14.8	14.7	14.5	14.4	14.2	14.0	13.8	13.7	13.5
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.50	4.44	4.36
	16.3	13.3	12.1	11.4	11.0	10.7	10.5	10.3	10.2	10.1	9.89	9.72	9.55	9.38	9.24	9.02
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.81	3.75	3.67
	13.7	10.9	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.72	7.56	7.40	7.23	7.09	6.88
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.38	3.32	3.23
	12.2	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.47	6.31	6.16	5.99	5.86	5.65

Table A8 (continued)

Df in denominator	Df in numerator															
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*12*	*15*	*20*	*30*	*50*	∞
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.08	3.02	2.93
	11.3	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.67	5.52	5.36	5.20	5.07	4.86
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.86	2.80	2.71
	10.6	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.11	4.96	4.81	4.65	4.52	4.31
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.70	2.64	2.54
	10.0	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.71	4.56	4.41	4.25	4.12	3.91
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.57	2.51	2.40
	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.40	4.25	4.10	3.94	3.81	3.60
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.47	2.40	2.30
	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.16	4.01	3.86	3.70	3.57	3.36
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.38	2.31	2.21
	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	3.96	3.82	3.66	3.51	3.38	3.17
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.31	2.24	2.13
	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.80	3.66	3.51	3.35	3.22	3.00
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.25	2.18	2.07
	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.67	3.52	3.37	3.21	3.08	2.87
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.19	2.12	2.01
	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.55	3.41	3.26	3.10	2.97	2.75
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.15	2.08	1.96
	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.46	3.31	3.16	3.00	2.87	2.65
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.11	2.04	1.92
	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.37	3.23	3.08	2.92	2.78	2.57

19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.07	2.00	1.88
	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.30	3.15	3.00	2.84	2.71	2.49
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.04	1.97	1.84
	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.23	3.09	2.94	2.78	2.64	2.42
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.92	1.84	1.71
	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13	2.99	2.85	2.70	2.54	2.40	2.17
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.84	1.76	1.62
	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.84	2.70	2.55	2.39	2.25	2.01
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	2.04	1.96	1.88	1.79	1.70	1.56
	7.42	5.27	4.40	3.91	3.59	3.37	3.20	3.07	2.96	2.88	2.74	2.60	2.44	2.28	2.14	1.89
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.74	1.66	1.51
	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.66	2.52	2.37	2.20	2.06	1.80
45	4.06	3.20	2.81	2.58	2.42	2.31	2.22	2.15	2.10	2.05	1.97	1.89	1.81	1.71	1.63	1.47
	7.23	5.11	4.25	3.77	3.45	3.23	3.07	2.94	2.83	2.74	2.61	2.46	2.31	2.14	2.00	1.74
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.95	1.87	1.78	1.69	1.60	1.44
	7.17	5.06	4.20	3.72	3.41	3.19	3.02	2.89	2.78	2.70	2.56	2.42	2.27	2.10	1.95	1.68
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.65	1.56	1.39
	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.50	2.35	2.20	2.03	1.88	1.60
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.88	1.79	1.70	1.60	1.51	1.32
	6.96	4.88	4.04	3.56	3.26	3.04	2.87	2.74	2.64	2.55	2.42	2.27	2.12	1.94	1.79	1.49
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.85	1.77	1.68	1.57	1.48	1.28
	6.90	4.82	3.98	3.51	3.21	2.99	2.82	2.69	2.59	2.50	2.37	2.22	2.07	1.89	1.74	1.43
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.55	1.46	1.25
	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.34	2.19	2.03	1.86	1.70	1.38
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.46	1.35	1.00
	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.18	2.04	1.88	1.70	1.52	1.00

Table A9 The Pearson product-moment correlation coefficient

The table gives the critical values of the Pearson product-moment correlation coefficient, r, for different numbers of pairs of observations, N. For significance, the calculated value of r must be *greater than or equal to* the critical value.

	Significance level: two-tailed/non-directional			
	0.20	*0.10*	*0.05*	*0.01*
	Significance level: one-tailed/directional			
N	*0.10*	*0.05*	*0.025*	*0.005*
3	0.951	0.988	0.997	1.000
4	0.800	0.900	0.950	0.990
5	0.687	0.805	0.878	0.959
6	0.608	0.729	0.811	0.917
7	0.551	0.669	0.754	0.875
8	0.507	0.621	0.707	0.834
9	0.472	0.582	0.666	0.798
10	0.443	0.549	0.632	0.765
11	0.419	0.521	0.602	0.735
12	0.398	0.497	0.576	0.708
13	0.380	0.476	0.553	0.684
14	0.365	0.458	0.532	0.661
15	0.351	0.441	0.514	0.641
16	0.338	0.426	0.497	0.623
17	0.327	0.412	0.482	0.606
18	0.317	0.400	0.468	0.590
19	0.308	0.389	0.456	0.575
20	0.299	0.378	0.444	0.561
21	0.291	0.369	0.433	0.549
22	0.284	0.360	0.423	0.537
23	0.277	0.352	0.413	0.526
24	0.271	0.344	0.404	0.515
25	0.265	0.337	0.396	0.505
26	0.260	0.330	0.388	0.496
27	0.255	0.323	0.381	0.487
28	0.250	0.317	0.374	0.479
29	0.245	0.311	0.367	0.471
30	0.241	0.306	0.361	0.463
40	0.207	0.264	0.312	0.403
50	0.184	0.235	0.279	0.361
60	0.168	0.214	0.254	0.330
70	0.155	0.198	0.235	0.306
80	0.145	0.185	0.220	0.286
90	0.136	0.174	0.207	0.270
100	0.129	0.165	0.197	0.256
200	0.091	0.117	0.139	0.182

Table A10 The Spearman rank correlation coefficient

The table gives the critical values of the Spearman rank correlation coefficient, ρ, for different numbers of pairs of observations, N.

	Significance level: two-tailed/non-directional			
	0.20	*0.10*	*0.05*	*0.01*
	Significance level: one-tailed/directional			
N	*0.10*	*0.05*	*0.025*	*0.005*
5	0.800	0.900	1.000	–
6	0.657	0.829	0.886	1.000
7	0.571	0.714	0.786	0.929
8	0.524	0.643	0.738	0.881
9	0.483	0.600	0.700	0.833
10	0.455	0.564	0.648	0.794
11	0.427	0.536	0.618	0.755
12	0.406	0.503	0.587	0.727
13	0.385	0.484	0.560	0.703
14	0.367	0.464	0.538	0.679
15	0.354	0.446	0.521	0.654
16	0.341	0.429	0.503	0.635
17	0.328	0.414	0.488	0.618
18	0.317	0.401	0.472	0.600
19	0.309	0.391	0.460	0.584
20	0.299	0.380	0.447	0.570
21	0.292	0.370	0.436	0.556
22	0.284	0.361	0.425	0.544
23	0.278	0.353	0.416	0.532
24	0.271	0.344	0.407	0.521
25	0.265	0.337	0.398	0.511
26	0.259	0.331	0.390	0.501
27	0.255	0.324	0.383	0.492
28	0.250	0.318	0.375	0.483
29	0.245	0.312	0.368	0.475
30	0.240	0.306	0.362	0.467
35	0.222	0.283	0.335	0.433
40	0.207	0.264	0.313	0.405
45	0.194	0.248	0.294	0.382
50	0.184	0.235	0.279	0.363
55	0.175	0.224	0.266	0.346
60	0.168	0.214	0.255	0.331