

ภาคผนวก

มาตราการวัด

1. **มาตรานามบัญญัติ (Nominal scale)** เป็นการวัดที่หยาบที่สุด เพราะเป็นเพียงการกำหนดสัญลักษณ์แทนคุณสมบัติอย่างใดอย่างหนึ่งของสิ่งใดสิ่งหนึ่งที่ต้องการวัดเท่านั้น สัญลักษณ์ที่กำหนดขึ้นนั้นมิได้มีความหมายในเชิงปริมาณเลย เช่นการกำหนดห้องเรียน เป็นห้อง ก ห้อง ข เป็นต้น หรือการกำหนดเบอร์ของนักฟุตบอล เป็นเบอร์ 1, 2, ในที่นี้จะเห็นได้ว่า เบอร์ 1, 2, หรือ ก, ข มิได้มีความหมายในเชิงปริมาณเลย คือไม่สามารถบอกได้ว่า $2 > 1$ หรือ ห้อง ก ใหญ่กว่าห้อง ข การวัดในระดับนี้เป็นเพียงการกำหนดสัญลักษณ์ เพื่อจำแนกให้เห็นว่าสิ่งที่ต้องการวัดนั้น แตกต่างกันเท่านั้นเอง

2. **มาตราอันดับ (Ordinal scale)** การวัดในขั้นนี้มีความหมายมากขึ้นกว่าในมาตรานามบัญญัติ กล่าวคือสัญลักษณ์ที่ใช้แทนคุณสมบัติอย่างใดอย่างหนึ่งของสิ่งนั้น ๆ สามารถนำมาเรียงลำดับจากน้อยไปหามาก หรือจากมากไปหาน้อยได้ เช่น ในการประกวดนางสาวไทยนั้น สามารถจัดอันดับคนที่มีความสวยได้ โดยจัดอันดับให้คนที่สวยที่สุดเป็นอันดับ 1 และคนถัดไปเป็นอันดับ 2, 3, 4 และ 5 ตามลำดับ แต่ไม่สามารถบอกได้เลยว่าคนที่ 1 สวยกว่าคนที่ 2 อยู่เท่าไร จะเห็นได้ว่า 1, 2, 3, 4 และ 5 นี้ไม่ได้แทนปริมาณและขนาดที่แท้จริง กล่าวคือ ที่ 1 ต่างจากที่ 2 อาจจะเท่าหรือไม่เท่ากับที่ 3 ต่างจากที่ 4 ($1 > 2$ อาจจะเท่าหรือไม่เท่ากับ $3 > 4$) ที่เป็นเช่นนี้เพราะขนาดของช่วงคะแนนแต่ละช่วงไม่เท่ากันนั่นเอง

3. **มาตราอันตรภาค (Interval scale)** เป็นการวัดที่มีคุณสมบัติเพิ่มเติมจากการวัดในมาตรานามบัญญัติ และมาตราอันดับ คือตัวเลขที่ต่างกันแทนปริมาณและคุณภาพที่ต่างกัน นั่นคือช่วงคะแนนแต่ละช่วงมีขนาดเท่ากัน ตัวอย่างที่เห็นได้ชัด ของการวัดในมาตรานี้ก็คือ การใช้เทอร์โมมิเตอร์วัดอุณหภูมิ กล่าวคือค่าความแตกต่างจาก 20°C ถึง 30°C จะเท่ากับค่าความแตกต่างจาก 40°C ถึง 50°C หรืออีกตัวอย่างหนึ่งได้แก่คะแนนที่ได้จากการสอบ เช่นในการสอบครั้งหนึ่ง จุ่มได้ 10 คะแนน จุ่มได้ 20 คะแนน เจียบได้ 30 คะแนน สามารถบอกได้ว่า จุ่มได้คะแนนมากกว่าจุ่มเท่ากับเจียบได้คะแนนมากกว่า

จิม แต่ไม่สามารถบอกได้ว่าจิมมีความรู้เป็น 2 เท่าของจิม ทั้งนี้เพราะการวัดในขั้นนี้ยังไม่มี ศูนย์แท้ (Absolute zero) ตัวอย่างเช่นการที่เด็กชายแดงได้คะแนน 0 ในวิชาเลขคณิต ก็มิได้หมายความว่าเด็กชายแดงไม่มีความรู้ในวิชาเลขคณิตเลย จะมีความหมายเพียงแต่ว่า เด็กชายแดงทำข้อสอบฉบับนั้นผิดทั้งหมด

4. **มาตราอัตราส่วน (Ratio scale)** การวัดในมาตรานี้ส่วนใหญ่เป็นการวัดทางวิทยาศาสตร์ เช่นการวัดความเร็ว การวัดส่วนสูง และการวัดน้ำหนักเป็นต้น การวัดในมาตรานี้มีคุณสมบัติเพิ่มเติมจากการวัดทั้ง 3 มาตรานี้ที่กล่าวมาแล้วคือมีศูนย์แท้ เช่น ถ้าน้ำหนัก 0 ก.ก. หมายความว่าไม่มีน้ำหนักเลย หรือนายแดงหนัก 40 ก.ก. นายเต๋อหนัก 20 ก.ก. สามารถกล่าวได้ว่านายแดงหนักเป็นสองเท่าของนายเต๋อ การวัดพฤติกรรมของมนุษย์นั้นมีน้อยมากที่จะวัดได้ถึงระดับนี้

Table 1 Squares and square roots of numbers from 1 to 1,000*

N	N^2	$\sqrt{N}$	$\sqrt{10N}$	N	N^2	$\sqrt{N}$	$\sqrt{10N}$
1	1	1.0000	3.1623	51	26 01	7.1414	22.5832
2	4	1.4142	4.4721	62	27 04	7.2111	22.8035
3	9	1.7321	6.4772	53	28 05	7.2801	23.0217
4	16	2.0000	6.3246	54	29 16	7.3485	23.2379
5	25	2.2361	7.0711	55	30 25	7.4162	23.4521
6	36	2.4495	7.7460	56	31 36	7.4833	23.6643
7	49	2.6458	6.3666	57	32 49	7.6498	23.8747
8	64	2.8284	6.3443	58	33 64	7.6158	24.0632
9	81	3.0000	3.4868	59	34 81	7.6811	24.2899
10	1 00	3.1623	10.0000	60	36 00	1.1460	24.4343
11	1 21	3.3166	10.4881	61	37 21	7.8102	24.6982
12	1 44	3.4641	10.9645	62	38 44	7.8740	24.8993
13	1 63	3.6066	11.4018	63	33 69	7.9373	25.0998
14	1 96	3.7417	11.8322	64	40 96	8.0000	25.2982
15	2 25	3.8730	12.2474	65	42 25	8.6623	26.4961
16	2 56	4.0000	12.6491	66	43 56	8.1240	26.6905
17	2 89	4.1231	13.0334	67	44 89	8.1864	26.8844
18	3 24	4.2426	13.4164	68	46 24	8.2462	26.0768
19	3 61	4.3583	13.7840	69	47 61	8.3066	26.2679
20	4 00	4.4721	14.1421	70	49 00	8.3666	26.4575
21	4 41	4.5826	14.4914	71	50 41	8.4261	26.6458
22	4 84	4.6904	14.8324	72	51 84	8.4653	26.8326
23	5 29	4.7958	15.1658	73	53 29	8.5440	27.0185
24	5 76	4.8990	15.4919	74	54 76	8.6023	27.2029
25	6 25	5.0000	15.8114	75	56 25	8.6603	27.3861
26	6 16	5.0990	16.1245	76	57 76	8.7173	27.5681
27	12 9	5.1962	16.4317	77	53 29	8.1750	27.7489
28	7 84	5.2915	16.7332	78	60 84	8.8318	27.9286
29	8 41	5.3852	17.0294	79	62 41	8.8882	28.1069
30	9 00	5.4772	17.3205	80	64 00	8.9443	28.2843
31	9 61	5.5678	17.6068	81	65 61	9.0000	28.4605
32	10 24	5.6569	17.6385	82	67 24	9.0554	28.6366
33	10 89	5.1446	18.1659	83	68 89	9.1104	28.8097
34	11 56	5.8310	16.4391	84	70 56	9.1652	28.9828
35	12 25	5.9161	13.1083	85	72 25	9.2195	29.1548
36	12 96	6.0000	18.9737	86	73 96	9.2736	29.3258
37	13 69	6.0828	19.2354	87	75 69	9.3274	29.4958
38	14 44	6.1644	19.4936	88	77 44	9.3808	29.6648
39	15 21	6.2450	19.7484	89	79 21	9.4340	29.8329
40	16 00	6.3246	20.0000	90	81 00	9.4868	30.0000
41	16 81	6.4031	20.2485	91	82 81	9.5394	30.1662
42	17 64	6.4807	20.4939	92	84 64	9.5917	30.3315
43	18 49	6.5574	20.7364	93	86 49	9.6437	30.4959
44	19 36	6.6332	20.9762	94	88 36	9.6954	30.6594
45	20 25	6.7082	21.2132	95	90 25	9.7468	30.8221
46	21 16	6.7823	21.4476	96	92 16	9.7980	30.9839
47	22 09	6.8557	21.6795	97	94 09	9.8489	31.1448
48	23 04	6.9282	21.9089	98	96 04	9.8995	31.3060
49	24 01	7.0000	22.1359	99	98 01	9.9499	31.4643
50	25 00	7.0711	22.3607	100	1 00 00	10.0000	31.6228

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Table 1 (Continued)

<i>N</i>	<i>N</i> ²	$\sqrt{N}$	$\sqrt{10N}$	<i>N</i>	<i>N</i> ²	$\sqrt{N}$	$\sqrt{10N}$
101	1 02 01	10.0499	31.7805	151	2 28 01	12.2882	38.8687
102	1 04 04	10.0995	31.9374	152	2 31 04	12.3238	38.9872
103	1 06 09	10.1489	32.0936	153	2 34 09	12.3693	39.1152
104	1 08 16	10.1980	32.2490	154	2 37 16	12.4097	39.2428
105	1 10 25	10.2410	32.4037	155	2 40 26	12.4499	39.3700
106	1 12 36	10.2956	32.5676	156	2 43 36	12.4900	39.4966
107	1 14 49	10.3441	32.7109	157	2 46 49	12.5300	39.6232
108	1 16 64	10.3923	32.8634	158	2 49 64	12.6698	39.7492
109	1 18 81	10.4403	33.0151	159	2 52 81	12.6095	39.8148
110	1 21 00	10.4881	33.1662	160	2 56 00	12.6491	40.0006
111	1 23 21	10.5367	33.3167	161	2 69 21	12.6886	40.1248
112	1 25 44	10.5830	33.4664	162	2 62 44	12.7279	40.2492
113	1 27 69	10.6301	33.6155	163	2 66 69	12.7671	40.3733
114	1 29 96	10.6771	33.7639	164	2 68 96	12.8062	40.4969
115	132 25	10.7238	33.9116	165	2 72 25	12.8462	40.6202
116	1 34 56	10.7743	34.0588	166	2 75 56	12.8841	40.7431
117	1 36 89	10.8167	34.2063	167	2 78 89	12.9228	40.8656
118	1 39 24	10.8628	34.3511	168	2 62 24	12.9615	40.9878
119	1 41 61	10.9087	34.4964	169	2 a5 61	13.0006	41.1096
120	1 44 00	10.9545	34.6410	170	2 89 00	13.0884	41.2311
121	1 46 41	11.0000	34.7851	171	2 92 41	13.0767	41.3621
122	1 48 84	11.0454	34.9285	172	2 96 a4	13.1149	41.4729
123	1 51 29	11.0905	35.0714	173	2 99 29	13.1529	41.5933
124	1 53 76	11.1355	35.2136	174	3 02 76	13.1909	41.7133
125	1 56 25	11.1803	35.3553	175	3 06 25	13.2268	41.6330
126	1 58 76	11.2250	35.4965	176	3 08 76	13.2665	41.9524
127	1 61 29	11.2694	35.6371	177	3 13 29	13.3641	42.0714
128	1 63 84	11.3137	35.7771	178	3 18 84	13.3417	42.1900
129	166 41	11.3578	35.9166	179	3 20 41	13.3791	42.3084
130	1 69 00	11.4018	36.0555	180	3 24 00	13.4164	42.4264
131	1 71 61	11.4465	36.1939	181	3 27 61	13.4536	42.5441
132	1 74 24	11.4891	36.3318	182	3 31 24	13.4907	42.6615
133	1 76 89	11.5326	36.4692	183	3 34 as	13.6277	42.7785
134	1 79 66	11.5768	36.6060	184	3 38 56	13.5647	42.8952
135	1 82 25	11.6190	36.7423	185	3 42 25	13.6015	43.0116
136	1 a4 69	11.6619	36.8782	186	3 46 96	13.6382	43.1271
137	1 87 69	11.7047	37.0135	187	3 49 69	13.6748	43.2435
138	190 44	11.7473	37.1484	188	3 53 44	13.1113	43.3590
139	1 93 21	11.7898	37.2827	189	3 57 21	13.7477	43.4741
140	1 96 00	11.8322	37.4166	190	3 61 00	13.7340	43.6896
141	1 98 81	11.8743	37.5500	191	3 64 a1	13.8203	43.7036
142	2 01 64	11.9164	37.6829	192	3 68 64	13.8564	43.8178
143	2 04 49	11.9583	37.8153	193	3 72 49	13.8924	43.9318
144	2 07 36	12.0000	37.9413	194	3 76 36	13.9284	44.0454
145	2 10 25	12.0416	38.0789	195	3 80 25	13.9642	44.1538
146	2 13 16	12.0830	38.2099	196	3 84 16	14.0000	44.2719
147	2 16 09	12.1244	38.3406	197	3 88 09	14.0357	44.3647
148	2 19 04	12.1655	38.4703	198	3 92 04	14.0712	44.4972
149	2 22 01	12.2066	38.6005	199	3 96 01	14.1067	44.6091
150	2 26 00	12.2474	38.7298	200	4 00 00	14.1421	44.7214

Table 1 (Continued)

<i>N</i>	<i>N'</i>	$\sqrt{N}$	$\sqrt{10N}$	<i>N</i>	<i>N'</i>	$\sqrt{N}$	$\sqrt{10N}$
201	4 04 01	14.1714	44.8330	261	6 30 01	16.8430	50.0999
202	4 08 04	14.2121	44.9444	262	6 36 04	15.8746	50.1996
203	4 12 09	14.2478	46.0666	263	6 40 05	16.9060	50.2991
204	4 16 16	14.2829	46.1664	264	6 46 16	16.9374	50.3984
206	4 20 25	14.3118	46.2169	266	6 60 25	16.9687	50.4916
206	4 24 36	14.3621	46.3812	266	6 55 36	16.0006	60.6964
201	4 28 49	14.3816	46.4973	267	6 60 49	16.0312	60.6952
208	4 32 64	14.4222	46.6070	268	6 66 64	16.0624	60.1937
209	4 36 81	14.4668	46.7166	269	6 10 81	16.0936	50.8920
210	4 41 00	14.4914	46.8268	260	6 76 00	16.1246	50.9902
211	4 45 21	14.6268	45.9347	261	6 81 21	16.1566	61.0832
212	4 49 44	14.5602	46.0436	262	6 86 44	16.1864	51.1869
213	4 53 69	14.6946	46.1519	263	6 91 69	16.2113	51.2836
214	4 67 96	14.6287	46.2601	264	6 96 96	16.2481	61.3809
216	4 62 26	14.6629	46.3681	265	7 02 25	16.2788	51.4162
216	4 66 66	14.6969	46.4158	266	1 01 66	16.3095	51.5162
217	4 70 89	14.7305	46.6833	261	1 12 89	16.3401	61.6720
218	4 75 24	14.7648	46.6905	268	1 18 24	16.3701	51.7687
219	4 79 61	14.1986	46.1974	269	123 61	16.4012	51.8652
220	4 a4 00	14.8324	46.9042	270	7 29 00	16.4317	51.9615
221	4 88 41	14.8661	47.0106	211	1 34 41	16.4621	62.0671
222	49 28 4	14.8997	47.1169	212	7 39 84	16.4924	52.1536
223	4 91 29	14.9332	41.2229	213	1 45 29	16.5221	52.2494
224	6 01 16	14.9666	41.3286	214	1 50 16	16.5529	52.3450
226	6 06 25	16.0000	47.4342	215	156 25	16.6831	52.4404
226	5 10 76	15.0333	41.5395	216	1 61 16	16.6132	62.5351
227	5 16 29	15.0666	47.6446	217	1 67 29	16.6433	52.6308
228	5 19 84	15.0991	47.7493	213	1 72 34	16.6133	52.7261
229	6 24 41	16.1321	47.8539	279	7 78 41	16.7033	52.3205
230	6 29 00	16.1658	41.9583	280	1 84 00	16.7332	52.9150
231	6 33 61	15.1987	48.0625	281	189 61	16.7631	53.0094
232	5 38 24	15.2315	48.1664	282	195 24	16.1929	63.1037
233	5 42 89	16.2643	48.2101	283	8 00 89	16.8226	53.1971
234	5 41 66	15.2911	48.3735	234	8 06 56	16.8523	53.2911
235	6 52 25	16.3291	48.4168	235	8 12 25	16.8819	53.3854
236	5 56 96	16.3623	48.5798	286	8 17 96	16.9115	53.4190
231	5 61 69	16.3948	48.6826	287	8 23 69	16.9411	63.5124
238	6 66 44	16.4212	48.7862	288	8 29 44	16.9106	53.6656
239	5 71 21	16.4696	48.8816	289	8 35 21	17.0000	53.7531
240	5 76 00	15.4919	48.9898	290	a 41 00	17.0294	53.3516
241	5 80 81	16.5242	49.0918	291	8 46 81	11.0581	53.9444
242	5 85 64	15.6563	49.1935	292	8 52 64	17.0330	54.0310
243	5 so 49	15.6885	49.2960	293	8 58 49	11.1112	54.1295
244	5 95 36	16.6206	49.3964	294	8 64 36	17.1464	54.2218
245	6 00 25	16.6625	49.4915	295	8 10 25	11.1156	54.3139
246	6 05 16	15.6844	49.5984	296	8 76 16	11.2047	54.4059
247	6 10 09	15.1162	49.6991	297	8 32 09	17.2331	54.4977
243	6 15 04	16.1480	49.7996	298	8 88 04	11.2621	54.6894
249	6 20 01	16.7791	49.8999	299	8 94 01	17.2916	54.6809
250	6 26 00	15.3114	50.0000	300	9 00 00	17.3205	64.7123

Table 1 (Continued)

N	N ²	$\sqrt{N}$	$\sqrt{10N}$	N	N ²	$\sqrt{N}$	$\sqrt{10N}$
301	9 06 01	17.3494	54.8635	351	12 32 01	18.7350	59.2453
302	9 12 04	17.3781	54.9545	352	12 39 04	18.7617	59.3296
303	9 18 09	17.4069	55.0454	353	12 46 09	18.7883	59.4138
304	9 24 16	17.4356	55.1362	354	12 53 16	18.8149	59.4919
305	9 30 25	17.4642	55.2268	355	12 60 25	18.8414	59.5819
306	9 36 36	17.4929	56.3173	356	12 67 36	18.8680	59.6657
307	9 42 49	17.5214	55.4076	357	12 74 49	18.8944	59.7495
308	9 48 64	17.5499	55.4977	358	12 81 64	18.9209	59.8331
309	9 54 81	17.5784	55.5878	359	12 88 81	18.9473	59.9166
310	9 61 00	17.6068	55.6776	360	12 96 00	18.9737	60.0000
311	9 67 21	17.6352	55.7674	361	13 03 21	19.0000	60.0833
312	9 73 44	17.6635	55.8570	362	13 10 44	19.0263	60.1664
313	9 79 69	17.6918	55.9464	363	13 17 69	19.0526	60.2495
314	9 85 96	17.7200	56.0357	364	13 24 96	19.0788	60.3324
315	9 92 25	17.7482	56.1249	365	13 32 25	19.1050	60.4152
316	9 98 56	17.7764	56.2139	366	13 39 56	19.1311	60.4979
317	10 04 89	17.8045	56.3028	367	13 46 89	19.1572	60.5805
318	10 11 24	17.8326	56.3915	368	13 54 24	19.1833	60.6630
319	10 17 61	17.8606	56.4801	369	13 61 61	19.2094	61.7454
320	10 24 00	17.8885	56.5685	370	13 69 00	19.2354	60.8276
321	10 30 41	17.9165	56.6569	371	13 76 41	19.2614	60.9098
322	10 36 84	17.9444	56.7450	372	13 83 84	19.2873	60.9918
323	10 43 29	17.9722	56.8331	373	13 91 29	19.3132	61.0737
324	10 49 76	18.0000	56.9210	374	13 98 76	19.3391	61.1555
325	10 56 25	18.0278	57.0088	375	14 06 25	19.3649	61.2312
326	10 62 76	18.0555	57.0964	376	14 13 76	19.3907	61.3188
327	10 69 29	18.0831	57.1839	377	14 21 29	19.4165	61.4003
328	10 75 84	18.1108	57.2713	378	14 28 84	19.4422	61.4817
329	10 82 41	18.1384	57.3585	379	14 36 41	19.4679	61.5630
330	10 89 00	18.1659	57.4456	380	14 44 00	19.4936	61.6441
331	10 95 61	18.1934	57.5326	381	14 51 61	19.5192	61.7252
332	11 02 24	18.2209	57.6194	382	14 59 24	19.5448	61.8061
333	11 08 89	18.2483	57.7062	383	14 66 89	19.5704	61.8870
334	11 15 56	18.2757	57.7927	384	14 74 56	19.6959	61.9677
335	11 22 25	18.3030	57.8792	385	14 82 25	19.6214	62.0484
336	11 28 96	18.3303	57.9655	386	14 89 96	19.6469	62.1289
337	11 35 69	18.3576	58.0517	387	14 97 69	19.6723	62.2093
338	11 42 44	18.3848	58.1378	388	15 05 44	19.6917	62.2896
339	11 49 21	18.4120	58.2237	389	15 13 21	19.7231	62.3699
340	11 56 00	18.4391	58.3095	390	15 21 00	19.7484	62.4500
341	11 62 81	18.4662	58.3952	391	15 28 81	19.7737	62.5306
342	11 69 64	18.4932	58.4808	392	15 36 64	19.7990	62.6099
343	11 76 49	18.5203	58.5662	393	15 44 49	19.8242	62.6897
344	11 83 36	18.5472	58.6515	394	15 52 36	19.8494	62.7694
345	11 96 25	18.5742	58.7367	396	15 60 25	19.8746	62.8496
346	11 97 16	18.6011	58.8218	396	15 68 16	19.8991	62.9285
347	12 04 09	18.6279	58.9067	397	15 76 09	19.9249	63.0079
348	12 11 04	18.6548	58.9915	398	15 84 04	19.9499	63.0872
349	12 18 01	18.6815	59.0762	399	15 92 01	19.9750	63.1664
350	12 25 00	18.7083	59.1608	400	16 00 00	20.9000	63.2456

Table 1 (Continued)

<i>N</i>	<i>N</i> ²	$\sqrt{N}$	$\sqrt{10N}$	<i>N</i>	<i>N</i> ²	$\sqrt{N}$	$\sqrt{10N}$
401	16 08 01	20.0260	63.3246	451	20 34 01	21.2368	67.1666
402	16 16 04	20.0499	63.4035	452	20 43 04	21.2603	61.2309
403	16 24 05	20.0149	63.4823	453	20 52 05	21.2838	67.3053
404	16 32 16	20.0998	63.6610	464	20 61 16	21.3073	67.3796
405	16 40 25	20.1246	63.6396	465	20 70 25	21.3307	67.4637
406	16 48 36	20.1494	63.1181	466	20 19 36	21.3542	67.5278
407	16 56 49	20.1742	63.7966	451	20 88 49	21.3776	61.6018
408	16 64 64	20.1990	63.8749	458	20 97 64	21.4009	67.6757
409	16 72 81	20.2237	63.9531	459	21 06 81	21.4243	61.7495
410	16 31 00	20.2486	64.0312	460	21 16 00	21.4476	67.8233
411	16 39 21	20.2731	64.1093	461	21 25 21	21.4709	61.8910
412	16 97 44	20.2978	64.1872	462	21 34 44	21.4942	67.9706
413	17 05 69	20.3224	64.2651	463	21 43 69	21.5174	68.0441
414	17 13 96	20.3470	64.3428	464	21 52 96	21.5407	68.1115
415	17 22 25	20.3115	64.4205	465	21 62 25	21.5639	68.1909
416	17 30 56	20.3961	64.4981	466	21 71 56	21.5870	68.2642
417	11 38 89	20.4206	64.5755	467	21 80 89	21.6102	68.3374
418	17 47 24	20.4450	64.6529	463	21 90 24	21.6333	68.4105
419	17 55 61	20.4695	64.7302	469	21 99 61	21.6564	68.4836
420	17 64 00	20.4939	64.8074	470	22 09 00	21.6795	68.5565
421	17 72 41	20.5183	64.8845	471	22 18 41	21.7025	68.6294
422	17 80 84	20.5426	64.9615	412	22 27 84	21.7256	68.7023
423	17 89 29	20.5670	65.0385	413	22 31 29	21.7486	68.7750
424	17 97 76	20.5913	65.1153	474	22 46 76	21.7715	68.8477
425	18 06 25	20.6155	65.1920	475	22 56 25	21.7945	68.9202
426	18 14 76	20.6398	65.2687	476	22 65 76	21.8174	68.9928
427	18 23 29	20.6640	65.3452	417	22 15 29	21.8403	69.0652
428	18 31 34	20.6382	65.4217	478	22 84 34	21.8632	69.1375
429	18 40 41	20.7123	65.4981	479	22 94 41	21.8861	69.2098
430	18 49 00	20.7364	65.5744	430	23 04 00	21.9089	69.2820
431	18 57 61	20.1605	65.6506	481	23 13 61	21.9317	69.3542
432	18 66 24	20.7846	65.7261	482	23 23 24	21.9545	69.4262
433	18 74 89	20.8087	65.8027	483	23 32 89	21.9773	69.4982
434	18 83 56	20.8321	65.8787	484	23 42 56	22.0000	69.5701
435	18 92 25	20.8567	65.9545	485	23 52 25	22.0227	69.6419
436	19 00 06	20.8806	66.0303	486	23 61 96	22.0454	69.7137
437	19 09 69	20.9045	66.1060	487	23 71 69	22.0681	69.7854
438	19 18 44	20.9284	66.1816	488	23 31 44	22.0907	69.8570
439	19 27 21	20.9523	66.2571	489	23 91 21	22.1133	69.9285
440	19 36 00	20.9162	66.3325	490	24 01 00	22.1359	70.0000
441	19 44 81	21.0000	66.4078	491	24 10 81	22.1585	70.0714
442	19 53 64	21.0238	66.4831	492	24 20 64	22.1811	70.1427
443	19 62 49	21.0416	66.5582	493	24 30 49	22.2036	70.2140
444	19 11 36	21.0713	66.6333	494	24 40 36	22.2261	70.2851
445	19 80 25	21.0950	66.7083	495	24 50 25	22.2436	70.3562
446	19 89 16	21.1181	66.1832	496	24 60 16	22.2711	70.4213
441	19 98 09	21.1424	66.8581	491	24 70 05	22.2935	70.4982
448	20 01 04	21.1660	66.9328	498	24 80 04	22.3159	70.5691
449	20 16 01	21.1896	67.0075	499	24 90 01	22.3333	70.6399
450	20 25 00	21.2132	67.0820	500	25 00 00	22.3607	70.7101

Table 1 (Continued)

N	N^2	$\sqrt{N}$	$\sqrt{10N}$	N	N^2	$\sqrt{N}$	$\sqrt{10N}$
501	25 10 01	22.3830	70.7814	551	30 36 01	23.4734	14.2294
502	25 20 04	22.4054	70.8520	552	30 47 04	23.4947	74.2967
503	25 30 09	22.4217	70.9225	553	30 58 09	23.5160	74.3640
504	25 40 16	22.4499	70.9930	554	30 69 16	23.5312	74.4312
505	25 50 25	22.4722	71.0634	555	30 80 25	23.5584	74.4983
506	25 60 36	22.4944	71.1337	556	30 91 36	23.5797	14.5654
507	25 10 49	22.5167	71.2039	557	31 02 49	23.6008	74.6324
508	25 80 64	22.5389	71.2741	558	31 13 64	23.6220	14.6994
509	25 90 81	22.5610	71.3442	559	31 24 81	23.6432	74.7663
510	26 01 00	22.5832	11.4143	560	31 36 00	23.6643	74.8331
511	26 11 21	22.6053	11.4843	561	31 47 21	23.6854	74.8999
512	26 21 44	22.6214	71.5542	562	31 58 44	23.7065	74.9661
513	26 31 69	22.6495	11.6240	563	31 69 69	23.7216	75.0333
514	26 41 96	22.6716	71.6938	564	31 80 96	23.7487	75.0999
515	26 52 25	22.6936	71.7635	565	31 92 25	23.7697	15.1665
516	26 62 56	22.7156	71.833,	566	32 03 56	23.7908	75.2330
511	26 72 89	22.7376	71.9027	567	32 14 89	23.8118	15.2994
518	26 83 24	22.7596	71.9722	568	32 26 24	23.8328	75.3658
519	26 93 61	22.7816	72.0411	569	32 37 61	23.8537	75.4321
520	27 04 00	22.8035	72.1110	510	32 49 00	23.8147	75.4983
521	21 14 41	22.8254	72.1803	571	32 60 41	233956	75.5645
522	27 24 84	22.8473	72.2496	572	32 71 84	23.9165	75.6301
523	27 35 29	22.8592	72.3187	573	32 83 29	23.9374	75.6966
524	27 45 76	22.8910	72.3878	574	32 94 76	23.9583	15.7628
525	27 56 25	22.9129	72.4569	575	33 06 25	23.9792	75.8288
526	27 66 76	22.9347	72.5259	576	33 17 76	24.0000	75.8947
521	27 11 29	22.9565	72.5948	577	33 29 29	24.0208	75.9605
528	27 87 84	22.9783	12.6636	578	33 40 84	24.0416	76.0263
520	27 98 41	23.0000	72.1324	519	33 52 41	24.0624	76.0920
530	28 09 00	23.0217	12.8011	580	33 64 00	24.0832	76.1577
531	28 19 61	23.0434	12.8697	581	33 15 61	24.1039	76.2234
532	28 30 24	23.0651	72.9383	582	33 81 24	24.1247	76.2889
533	28 40 89	23.0868	73.0068	583	33 98 89	24.1454	76.3544
534	28 51 56	23.1084	13.0753	584	34 10 56	24.1661	76.4199
535	28 62 25	23.1301	73.1431	585	34 22 25	24.1868	76.4853
536	28 12 96	23.1517	73.2120	586	34 33 96	24.2074	16.5506
537	28 83 69	23.1733	73.2803	587	34 45 69	24.2281	76.6159
538	28 94 44	23.1948	13.3485	588	34 57 44	24.2487	76.6812
539	29 05 21	23.2164	73.4166	589	34 69 21	24.2693	76.7463
540	29 16 00	23.2379	73.4847	590	34 81 00	24.2899	76.8115
541	29 26 81	23.2594	73.5527	591	34 92 81	24.3105	76.8765
542	29 37 64	23.2809	13.6206	592	35 04 64	24.3311	76.9415
543	29 48 49	23.3024	73.6885	593	35 16 49	24.3516	77.0065
544	29 59 36	23.3238	73.7564	594	35 28 36	24.3721	77.0714
545	29 70 25	23.3452	73.8241	595	35 40 25	24.3926	77.1362
546	29 81 16	23.3666	73.8918	596	35 52 16	24.4131	77.2010
547	29 92 09	23.3880	13.9594	597	35 64 09	24.4336	77.2668
548	30 03 04	23.4094	74.0270	598	35 76 04	24.4540	77.3306
549	30 14 01	23.4307	74.0945	599	35 88 01	24.4146	17.3961
550	30 25 00	23.4521	74.1620	600	36 00 00	24.4949	77.4597

Table 1 (Continued)

N	N^2	$\sqrt{N}$	$\sqrt{10N}$	N	N^2	$\sqrt{N}$	$\sqrt{10N}$
601	36 12 01	24.5153	77.5242	651	42 38 01	25.5147	80.6846
602	36 24 04	24.5357	77.5887	652	42 51 04	25.5343	80.7465
603	36 36 09	24.5561	77.6531	653	42 64 09	25.5539	80.8084
604	36 48 16	24.5764	77.7174	654	42 77 16	25.5734	80.8703
605	36 60 25	24.5967	77.7811	655	42 90 25	25.5930	80.9321
606	36 72 36	24.6171	77.8460	656	43 03 36	25.6125	80.9938
607	36 84 49	24.6374	77.9102	657	43 16 49	25.6320	81.0555
608	36 96 64	24.6571	77.9744	658	43 29 64	25.6515	81.1172
609	37 08 81	24.6179	78.0385	659	43 42 81	25.6710	81.1788
610	37 21 00	24.6982	78.1025	660	43 56 00	25.6905	81.2404
611	37 33 21	24.7184	78.1665	661	43 69 21	25.7099	81.3019
612	37 45 44	24.7386	78.2304	662	43 82 44	25.7294	81.3634
613	37 57 69	24.7588	78.2943	663	43 95 69	25.7488	81.4248
614	37 69 96	24.7790	78.3582	664	44 08 96	25.7682	81.4862
615	38 82 25	24.7992	78.4219	665	44 22 25	25.7876	81.5475
616	37 94 56	24.8193	78.4857	666	44 35 56	25.8070	81.6088
617	38 06 89	24.8395	78.5493	667	44 48 89	25.8263	81.6701
618	38 19 24	24.8596	78.6130	668	44 62 24	25.8457	81.7313
619	38 31 61	24.8797	78.6766	669	44 75 61	25.8650	81.7924
620	38 44 00	24.8998	78.7401	670	44 89 00	25.8844	81.8535
621	38 56 41	24.9199	78.8036	671	45 02 41	25.9037	81.9146
622	38 68 84	24.9399	78.8670	672	45 15 84	25.9230	81.9756
623	38 81 29	24.9600	78.9303	673	45 29 29	25.9422	82.0366
624	38 93 76	24.9800	78.9937	674	45 42 76	25.9615	82.0975
625	39 06 25	25.0000	79.0569	675	45 56 25	25.9808	82.1584
626	39 18 76	25.0200	79.1202	676	45 69 76	26.0000	82.2192
627	39 31 29	25.0400	79.1833	677	45 83 29	26.0192	82.2800
628	39 43 84	25.0599	79.2465	678	45 96 84	26.0384	82.3408
629	39 56 41	25.0799	79.3095	679	46 10 41	26.0576	82.4015
630	39 69 00	25.0998	79.3725	680	46 24 00	26.0768	82.4621
631	39 81 61	25.1197	79.4355	681	46 37 61	26.0960	82.5227
632	39 94 24	25.1396	79.4984	682	46 51 24	26.1151	82.5833
633	40 06 89	25.1595	79.5613	683	46 64 89	26.1343	82.6438
634	40 19 66	25.1794	79.6241	684	46 78 56	26.1534	82.7043
635	40 32 25	25.1992	79.6869	685	46 92 25	26.1725	82.7641
636	40 44 96	25.2190	79.7496	686	47 05 96	26.1916	82.8251
637	40 57 69	25.2389	79.8123	687	47 19 69	26.2107	82.8855
638	40 70 44	25.2587	79.8749	688	47 33 44	26.2298	82.9458
639	40 83 21	25.2784	79.9375	689	47 47 21	26.2489	83.0060
640	40 96 00	25.2982	80.0000	690	47 61 00	26.2679	83.0662
641	41 08 81	25.3180	80.0625	691	47 74 81	26.2869	83.1264
642	41 21 64	25.3377	80.1249	692	47 88 64	26.3059	83.1865
643	41 34 49	25.3574	80.1873	693	48 02 49	26.3249	83.2466
644	41 47 36	25.3772	80.2496	694	48 16 36	26.3439	83.3067
645	41 60 25	25.3969	80.3119	695	48 30 25	26.3629	83.3667
646	41 73 16	25.4165	80.3744	696	48 44 16	26.3818	83.4266
647	41 86 09	25.4362	80.4363	697	48 58 09	26.4008	83.4865
648	41 99 04	25.4558	80.4984	698	49 11 56	26.4197	83.5464
649	42 12 01	25.4755	80.5605	699	49 25 44	26.4386	83.6062
650	42 25 00	25.4951	80.6226	700	49 39 36	26.4575	83.6660

Table 1 (Continued)

<i>N</i>	<i>N</i> ²	$\sqrt{N}$	$\sqrt{10N}$	<i>N</i>	<i>N</i> ²	$\sqrt{N}$	$\sqrt{10N}$
701	49 14 01	26.4164	83.7255	751	56 40 01	27.4044	86.6603
702	49 28 04	26.4953	83.7854	752	56 55 04	27.4226	86.7179
703	49 42 09	26.5141	83.8451	753	56 70 09	27.4408	86.7756
704	49 56 16	26.5330	83.9047	754	56 85 16	27.4591	86.8332
705	49 70 25	26.5518	83.9643	755	57 00 25	27.4173	86.8907
706	49 84 36	26.5707	84.0238	756	57 15 36	21.4955	86.9483
707	49 98 49	26.5895	84.0833	757	57 30 49	27.5136	87.0057
708	50 12 64	26.6083	84.1427	758	57 45 64	27.5318	87.0632
709	50 26 81	26.6271	84.2021	759	57 60 81	27.5500	87.1206
710	50 41 00	26.6458	84.2615	760	57 76 00	27.5681	87.1780
711	50 55 21	26.6646	84.3208	161	57 91 21	27.5862	37.2353
712	50 69 44	26.6833	84.3801	762	58 06 44	27.6043	87.2926
713	50 83 69	26.7021	84.4393	763	58 21 69	27.6225	87.3499
714	50 98 16	26.7208	84.4985	164	58 36 96	21.6405	87.4071
715	51 12 25	26.7395	84.5577	765	58 52 25	21.6586	87.4643
716	51 26 56	26.7582	84.6168	766	58 67 56	27.6767	87.5214
717	51 40 89	26.7769	84.6759	767	58 82 89	27.6948	87.5785
718	51 55 24	26.7955	84.7349	768	58 98 24	27.7128	87.6356
719	51 69 61	26.8142	84.7939	769	59 13 61	27.7308	87.6926
720	51 84 00	26.8328	84.8528	770	59 29 00	27.7489	87.7496
721	51 98 41	26.8514	84.9117	771	59 44 41	27.7669	87.8066
722	52 12 84	26.8701	84.9706	772	59 59 84	27.7849	87.8635
723	52 27 29	26.8887	85.0294	773	59 75 29	27.8029	87.9204
724	52 41 76	26.9072	85.0882	774	59 90 76	27.8209	87.9773
725	52 56 25	26.9258	85.1469	175	60 06 25	27.3338	88.0341
726	52 70 76	26.9444	85.2056	776	60 21 76	27.8568	88.0909
727	52 85 29	26.9629	85.2643	777	60 37 29	27.8747	88.1476
728	52 99 84	26.9815	85.3229	778	60 52 84	21.8927	88.2043
729	53 14 41	27.0000	85.3815	779	60 68 41	27.9106	88.2610
730	53 29 00	27.0185	85.4406	780	60 84 00	27.9285	88.3176
731	53 43 61	27.0370	85.4985	761	60 99 61	27.9464	88.3742
732	53 58 24	27.0555	85.5570	782	61 15 24	27.9643	88.4308
733	53 72 89	27.0740	85.6154	783	61 30 89	27.9821	88.4873
734	53 87 56	27.0924	85.6738	784	61 46 56	28.0000	88.5438
735	54 02 26	27.1109	85.7321	785	61 62 25	28.0179	88.6002
736	54 16 96	27.1293	85.7904	786	61 77 96	28.0357	88.6566
737	54 31 69	27.1477	85.8487	787	61 93 69	28.0535	88.7130
738	54 46 44	27.1662	85.9069	788	62 09 44	28.0713	88.7694
739	54 61 21	27.1846	85.9651	789	62 25 21	28.0891	88.8251
740	54 76 00	27.2029	86.0233	790	62 41 00	28.1069	88.8819
741	54 90 41	27.2213	86.0814	791	62 56 81	28.1247	88.9382
742	55 06 64	27.2397	86.1394	792	62 72 64	28.1425	88.9944
743	55 20 49	27.2580	86.1914	793	62 88 49	28.1603	89.0505
744	55 35 36	27.2764	86.2554	794	63 04 36	28.1780	89.1067
745	55 50 25	27.2947	86.3134	795	63 20 25	28.1957	89.1628
746	55 65 16	27.3130	86.3713	796	63 36 16	28.2135	89.2188
747	55 80 09	27.3313	86.4292	797	63 52 09	28.2312	89.2749
748	55 95 04	27.3496	86.4870	798	64 08 04	28.2489	89.3308
749	56 10 01	27.3679	86.5448	799	64 24 01	28.2666	89.3868
750	56 25 00	27.3861	86.6025	800	64 40 00	28.2843	89.4427

Table 1 (Continued)

N	N ²	$\sqrt{N}$	$\sqrt{10N}$	N	N ²	$\sqrt{N}$	$\sqrt{10N}$
801	64 16 01	28.3019	89.4986	851	72 42 01	29.1719	92.2491
802	64 32 04	28.3196	89.6645	852'	72 69 04	29.1890	92.3038
803	64 48 05	28.3373	89.6103	863	12 76 05	29.2062	92.3580
804	64 64 16	28.3549	89.6660	864	72 33 16	29.2233	92.4121
806	64 80 25	28.3725	89.7218	855	13 10 26	29.2404	92.4662
806	64 96 36	28.3901	89.7775	856	73 27 36	29.2575	92.5203
807	65 12 49	28.4077	89.8332	857	73 44 49	29.2746	92.5743
808	66 28 64	28.4253	89.8888	868	73 61 64	29.2916	92.6283
809	65 44 81	28.4429	89.9444	859	73 78 81	29.3087	92.6823
810	65 61 00	28.4605	90.0000	860	73 96 00	29.3258	92.7362
811	65 77 21	28.4781	90.0655	861	74 13 21	29.3428	92.7901
812	65 93 44	28.4966	90.1110	862	74 30 44	29.3598	92.8440
813	66 05 69	28.5132	90.1665	863	74 47 69	29.3769	92.8978
814	66 26 96	28.5307	90.2219	864	14 64 96	29.3939	92.9516
816	66 42 26	28.5482	90.2774	865	74 82.25	29.4109	93.0054
816	66 58 56	28.5657	90.3327	866	74 99 56	29.4279	93.0591
817	66 74 89	28.5832	90.3881	867	75 16 89	29.4449	93.1128
818	66 91 24	28.6007	90.4434	868	75 34 24	29.4618	93.1665
819	67 07 61	28.6182	90.4986	869	75 51 61	29.4788	93.2202
820	67 24 00	28.6356	90.5539	870	75 69 00	29.4958	93.2738
821	67 40 41	28.6531	90.6091	871	75 86 41	29.5127	93.3274
822	67 56 84	28.6705	90.6642	872	76 03 84	29.5296	93.3809
823	67 73 29	28.6880	90.7193	873	76 21 29	29.5466	93.4345
824	67' 89 76	28.7054	90.7744	374	76 38 76	29.5635	93.4880
325	68 06 25	28.7228	90.8295	875	76 56 25	29.5804	93.5414
826	68 22 76	28.7402	90.8845	876	76 73 76	29.5973	93.5949
827	68 39 29	28.7576	90.9395	817	76 91 29	29.6142	93.6483
828	68 55 84	28.7750	90.9945	878	77 08 84	29.6311	93.7011
829	68 72 41	28.7924	91.0494	879	77 26 41	29.6479	93.7531
830	68 89 00	28.8097	91.1043	880	77 44 00	29.6648	93.8063
831	69 05 61	28.8271	91.1592	881	77 61 61	29.6816	93.8616
832	69 22 24	28.8444	91.2140	882	77 79 24	29.6985	93.9149
833	69 38 89	28.8617	91.2688	883	77 96 89	29.7153	93.9681
834	69 55 56	28.8791	91.3236	884	78 14 56	29.7321	94.0213
835	69 72 25	28.8964	91.3783	885	78 32 25	29.7489	94.0744
836	69 88 96	28.9137	91.4330	886	78 49 96	29.7658	94.1276
837	70 05 69	28.9310	91.4877	887	78 67 69	29.7825	94.1807
838	70 22 44	28.9482	91.5423	888	78 85 44	29.7993	94.2338
839	70 39 21	28.9655	91.5969	883	79 03 21	29.8161	94.2868
840	70 56 00	28.9828	91.6515	890	79 21 00	29.8329	94.3398
841	70 72 81	29.0000	91.7061	891	79 38 81	29.8496	94.3928
842	70 89 64	29.0172	91.7606	692	79 56 64	29.8664	94.4458
843	71 06 49	29.0345	91.8150	893	79 14 49	29.8831	94.4987
844	71 23 36	29.0517	91.8695	894	79 92 36	29.8998	94.5516
845	71 40 25	29.0689	91.9239	895	80 10 25	29.9166	94.6044
846	71 57 16	29.0861	91.9783	896	80 28 16	29.9333	94.6573
847	71 74 09	29.1033	92.0326	897	80 46 05	29.9500	94.7101
848	71 91 04	29.1204	92.0869	838	80 64 04	29.9666	94.7629
849	72 08 01	29.1376	92.1412	899	80 82 01	29.9833	94.8156
850	72 25 00	29.1548	92.1954	900	81 00 00	30.0000	94.8683

Table 1 (Continued)

N	N^2	$\sqrt{N}$	$\sqrt{10N}$	N	N^2	$\sqrt{N}$	$\sqrt{10N}$
901	81 18 01	30.0167	94.9210	951	90 44 01	30.8383	97.5192
902	81 36 04	30.0333	94.9737	952	SO 63 04	30.8545	97.5705
903	81 54 09	30.0500	95.0263	953	so 82 09	30.8707	97.6217
904	81 72 16	30.0666	95.0789	954	91 01 16	30.8869	97.6729
905	81 90 25	30.0832	95.1315	955	91 20 25	30.9031	97.7241
906	82 08 36	30.0998	95.1840	956	91 39 36	30.9192	97.7753
907	82 26 49	30.1164	95.2365	957	91 58 49	30.9354	97.8264
908	a2 44 64	30.1330	95.2890	958	91 77 64	30.9516	97.8775
909	82 62 81	30.1496	95.3415	959	91 96 81	30.9677	97.9285
910	82 81 00	30.1662	95.3939	960	92 16 00	30.9839	97.9796
911	82 99 21	30.1828	95.4463	961	92 35 21	31.0000	98.0306
912	83 17 44	30.1993	95.4987	962	92 54 44	31.0161	98.0816
913	83 35 69	30.2159	95.5510	963	92 73 69	31.0322	98.1326
914	83 53 96	30.2324	95.6033	964	92 92 96	31.0483	98.1835
915	83 72 25	30.2490	95.6556	965	93 12 25	31.0644	98.2344
916	83 90 56	30.2655	95.7079	966	93 31 56	31.0805	98.2853
917	84 08 89	30.2820	95.7601	967	93 50 89	31.0966	98.3362
918	84 27 24	30.2985	95.8123	968	93 70 24	31.1127	98.3870
919	84 45 61	30.3150	95.8645	969	93 89 61	31.1288	98.4378
920	84 64 00	30.3315	95.9166	970	94 09 00	31.1448	98.4886
921	84 82 41	30.3480	95.9687	971	94 28 41	31.1609	98.5393
922	85 00 84	30.3645	96.0208	972	94 47 84	31.1769	98.5901
923	35 19 29	30.3809	96.0729	973	94 67 29	31.1929	98.6408
924	85 37 76	30.3974	96.1249	974	94 86 76	31.2090	98.6914
925	85 56 25	30.4138	96.1769	975	95 06 25	31.2250	98.7421
926	85 74 76	30.4302	96.2289	376	95 25 76	31.2410	98.7927
927	85 93 29	30.4467	96.2808	977	95 45 29	31.2570	98.8433
928	86 11 84	311.4631	96.3328	978	95 64 84	31.2730	98.8939
929	86 30 41	30.4795	96.3846	979	95 84 41	31.2890	98.9444
930	86 49 00	30.4959	96.4365	9x0	96 04 00	31.3050	98.9949
931	86 67 61	30.5123	96.4883	981	96 23 61	31.3209	99.0454
932	86 86 24	30.5287	96.5401	982	36 43 24	31.3365	99.0959
933	87 04 59	30.5450	96.5919	983	96 62 89	31.3528	99.1464
934	37 23 56	30.5614	96.6437	984	96 82 56	31.3688	99.1968
935	87 42 25	30.5778	96.6954	985	97 02 25	31.3847	99.2472
936	87 60 96	30.5941	96.7471	986	97 21 96	31.4006	99.2975
937	87 79 69	30.6105	96.7988	987	97 41 69	31.4166	99.3479
938	87 98 44	30.6268	96.8504	988	97 61 44	31.4325	99.3982
939	88 17 21	30.6431	96.9020	989	97 81 21	31.4484	99.4485
940	88 36 00	30.6594	96.9536	990	98 01 00	31.4643	99.4987
941	88 64 81	30.6767	97.0052	991	98 20 81	31.4802	99.5490
942	88 73 64	30.6920	97.0667	992	98 40 64	31.4960	99.5992
943	88 92 49	30.7083	97.1082	993	98 60 49	31.5119	99.6494
944	89 11 36	30.7246	97.1597	994	98 80 36	31.5278	99.6995
945	89 30 26	30.7409	97.2111	995	99 00 25	31.5436	99.7497
946	89 49 16	30.7571	97.2626	996	99 20 16	31.5595	99.7998
947	89 68 09	30.7734	97.3139	997	99 40 09	31.5753	99.8499
948	89 87 04	30.7896	97.3663	998	99 60 04	31.6911	99.8999
949	90 06 01	30.8068	97.4166	999	99 80 01	31.6070	99.9500
960	90 25 00	30.8221	97.4679	1,000	1 00 00 00	31.6228	100.0000

Table 2 Areas under the Normal Curve

Proportion of Total Area Under the Normal Curve Between Mean Ordinate and Ordinate at Given z Distance from the Mean

$\frac{z}{\sigma}$ or z	Second decimal place in z									
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998									
4.0	.49997									
4.5	.499997									
5.0	.4999997									

Table 3 Ordinates of the **Normal** Curve

<i>p</i>	<i>P</i>	<i>Y</i>	<i>pq/y</i>	<i>p</i>	<i>P</i>	<i>Y</i>	<i>pq/y</i>
.01	.99	.027	.372	.26	.74	.324	.593
.02	.98	.048	.405	.27	.73	.331	.596
.03	.97	.068	.428	.28	.72	.337	.599
.04	.96	.086	.446	.29	.71	.342	.602
.05	.95	.103	.461	.30	.70	.348	.604
.06	.94	.119	.474	.31	.69	.353	.606
.07	.93	.134	.485	.32	.68	.358	.609
.08	.92	.149	.495	.33	.67	.362	.612
.09	.91	.162	.504	.34	.66	.366	.612
.10	.90	.176	.513	.35	.65	.370	.614
.11	.89	.188	.521	.36	.64	.374	.616
.12	.88	.200	.528	.37	.63	.378	.617
.13	.87	.212	.535	.38	.62	.381	.619
.14	.86	.223	.541	.39	.61	.384	.620
.15	.85	.233	.547	.40	.60	.386	.621
.16	.84	.243	.552	.41	.59	.389	.622
.17	.83	.253	.558	.42	.58	.391	.623
.18	.82	.262	.563	.43	.57	.393	.624
.19	.81	.271	.567	.44	.56	.394	.625
.20	.80	.280	.572	.45	.55	.396	.625
.21	.79	.288	.576	.46	.54	.397	.626
.22	.78	.296	.580	.47	.53	.398	.626
.23	.77	.304	.583	.48	.52	.398	.626
.24	.76	.311	.587	.49	.51	.399	.627
.25	.75	.318	.590	.50	.50	.399	.627

Table 4 Critical values of t^*

Level of significance for one-tailed test						
	.10	.05	.025	.01	.005	.0005
Level of significance for two-tailed test						
I	.20	.10	.05	.02	.01	.001
	3.078	6.314	12.706	31.821	63.657	636.619
3	1.886	2.920	4.303	6.965	9.925	31.598
4	1.638	2.353	3.182	4.541	5.841	12.941
5	1.533	2.132	2.776	3.747	4.604	8.610
6	1.476	2.015	2.571	3.365	4.032	6.859
7	1.440	1.943	2.447	3.143	3.707	5.959
8	1.415	1.895	2.365	2.998	3.499	5.405
9	1.397	1.860	2.306	2.896	3.355	5.041
10	1.383	1.833	2.262	2.821	3.250	4.781
11	1.372	1.812	2.228	2.764	3.169	4.587
12	1.363	1.796	2.201	2.718	3.106	4.437
13	1.356	1.782	2.179	2.681	3.055	4.318
14	1.350	1.771	2.160	2.650	3.012	4.221
15	1.345	1.761	2.145	2.624	2.977	4.140
16	1.341	1.753	2.131	2.602	2.947	4.073
17	1.337	1.746	2.120	2.583	2.921	4.015
18	1.333	1.740	2.110	2.567	2.898	3.965
19	1.330	1.734	2.101	2.552	2.878	3.922
20	1.328	1.729	2.093	2.539	2.861	3.883
21	1.325	1.725	2.086	2.528	2.845	3.850
22	1.323	1.721	2.080	2.518	2.831	3.819
23	1.321	1.717	2.074	2.508	2.819	3.792
24	1.319	1.714	2.069	2.500	2.807	3.767
25	1.318	1.711	2.064	2.492	2.797	3.745
26	1.315	1.708	2.060	2.485	2.787	3.725
27	1.315	1.706	2.056	2.479	2.779	3.707
28	1.314	1.703	2.052	2.473	2.771	3.690
29	1.313	1.701	2.048	2.467	2.763	3.674
30	1.311	1.699	2.045	2.462	2.756	3.659
40	1.310	1.697	2.042	2.457	2.750	3.646
60	1.303	1.684	2.021	2.423	2.704	3.551
80	1.296	1.671	2.000	2.390	2.660	3.460
100	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

* Abridged from Table III of R. A. Fisher and F. Yates, *Statistical tables for biological, agricultural, and medical research*, published by Oliver & Boyd, Ltd., Edinburgh, by permission of the authors and publishers.

Table 5 Coefficients of correlation and *t* ratios significant at the .05 level (lightface type) and at the .01 level (boldface type) for varying degrees of freedom*

Degrees of freedom	Number of variables										<i>t</i>
	2	3	4	5	6	7	8	9	10	11	
1	.997	.999	.999	.999	1.000	1.000	1.000	1.000	1.000	1.000	12.706
	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	63.657
2	.950	.975	.983	.987	.990	.992	.994	.996	.998	.998	4.592
	.995	.997	.998	.998	.998	.998	.999	.999	.999	1.898	9.925
3	.878	.930	.950	.961	.968	.973	.979	.986	.993	.993	3.182
	.959	.976	.983	.987	.990	.991	.993	.995	.998	.998	5.841
4	.811	.881	.912	.930	.942	.950	.961	.973	.986	.986	2.776
	.917	.949	.962	.970	.975	.979	.984	.989	.994	.994	4.604
5	.754	.836	.874	.898	.914	.925	.941	.958	.978	.978	2.611
	.874	.917	.937	.949	.957	.963	.971	.980	.989	.989	4.922
6	.707	.795	.839	.867	.886	.900	.929	.943	.969	.969	2.44,
	.834	.886	.911	.927	.938	.946	.957	.969	.983	.983	3.707
7	.666	.758	.807	.838	.860	.876	.900	.927	.960	.960	2.365
	.798	.855	.885	.904	.918	.928	.942	.958	.977	.977	2.499
8	.632	.726	.777	.811	.835	.854	.880	.912	.950	.950	2.306
	.827	.860	.882	.898	.912	.926	.946	.970	.990	.990	3.355
9	.602	.697	.750	.786	.812	.832	.861	.897	.941	.941	2.262
	.735	.800	.836	.861	.878	.891	.911	.934	.963	.963	3.250
10	.576	.671	.726	.763	.790	.812	.843	.882	.932	.932	2.228
	.708	.776	.814	.840	.859	.874	.895	.922	.955	.955	3.199
11	.553	.648	.703	.741	.770	.792	.826	.868	.922	.922	2.201
	.684	.753	.793	.821	.841	.851	.880	.910	.948	.948	3.106
12	.532	.627	.683	.722	.751	.774	.809	.854	.913	.913	2.179
	.661	.732	.773	.802	.824	.841	.866	.898	.940	.940	5.856
13	.514	.608	.664	.703	.733	.757	.794	.840	.904	.904	2.160
	.641	.712	.755	.785	.807	.825	.852	.886	.932	.932	3.012
14	.497	.590	.646	.686	.717	.741	.779	.828	.895	.895	2.145
	.623	.694	.737	.768	.792	.810	.838	.875	.924	.924	2.977
15	.482	.574	.630	.670	.701	.726	.765	.815	.886	.886	2.131
	.607	.677	.721	.752	.776	.796	.825	.864	.917	.917	2.94,
16	.468	.559	.615	.655	.686	.712	.751	.803	.878	.878	2.120
	.592	.662	.706	.738	.762	.782	.813	.853	.909	.909	2.921
17	.456	.545	.601	.641	.673	.698	.738	.792	.869	.869	2.110
	.575	.647	.691	.724	.749	.769	.800	.842	.902	.902	2.898
18	.444	.532	.587	.628	.660	.686	.726	.781	.861	.861	2.101
	.561	.633	.678	.710	.736	.756	.789	.832	.894	.894	2.818
19	.433	.520	.575	.615	.647	.674	.714	.770	.853	.853	2.093
	.549	.620	.665	.698	.723	.744	.778	.822	.887	.887	2.861
20	.423	.509	.563	.604	.636	.662	.703	.760	.845	.845	2.086
	.537	.608	.652	.685	.712	.733	.767	.812	.880	.880	2.848
21	.413	.498	.552	.592	.624	.651	.693	.750	.837	.837	2.080
	.526	.596	.641	.674	.700	.722	.756	.803	.873	.873	2.881
22	.404	.488	.542	.582	.614	.640	.682	.740	.830	.830	2.074
	.515	.585	.630	.663	.690	.712	.746	.794	.866	.866	2.819
23	.396	.479	.532	.572	.604	.630	.673	.731	.823	.823	2.069
	.505	.574	.619	.652	.679	.701	.736	.785	.859	.859	2.867

*Adapted from Wallace, H. A., and Snedecor, G. W. *Correlation and Machine Calculation*. Ames, Iowa: Iowa State College, 1931, by courtesy of the authors.

Table 6 Critical values of the correlation coefficient*

df	<i>Level of significance for one-tailed test</i>			
	.05	.025	.01	.005
	<i>Level of significance for two-tailed test</i>			
	.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	734	833	874
6	622	707	789	834
7	582	666	750	798
8	549	632	716	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	542	590
17	389	456	528	575
18	378	444	516	561
19	369	433	503	549
20	360	423	492	53i
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	303
80	183	217	256	283
90	173	205	242	267
100	164	195	230	254

* Abridged from R. A. Fisher and F. Yates, *Statistical tables for biological, agricultural, and medical research*, Oliver & Boyd, Ltd., Edinburgh, by permission of the authors and publishers.

Table 7 Critical values of ρ , the Spearman rank correlation coefficient*

N	Significance level (one-tailed test)	
	.05	.01
4	1.000	
5	.900	1.000
6	.829	.943
7	.714	.893
8	.643	.833
9	.600	.783
10	.564	.746
12	.506	.712
14	.456	.645
16	.425	.601
18	.399	.564
20	.377	.534
22	.359	.508
24	.343	.485
26	.329	.465
28	.317	.448
30	.306	.432

* Adapted from E. G. Olds, Distributions of sums of squares of rank differences for small numbers of individuals, *Annals of Mathematical Statistics*, 9, 133-148, 1938; The 5% significance levels for sums of squares of rank differences and a correction, *Annals of Mathematical Statistics*, 20, 117-118, 1949; with the kind permission of the author and the publisher.

Table 8 Distribution of Chi-Square for Given Probability Levels

<i>df</i>	.99	.98	.95	.90	.80	.70	.50	.30	.20	.10	.05	.02	.01	.001
1	.00016	.00663	.00393	.0156	.0642	.148	.455	1.074	1.642	2.706	3.841	5.412	6.635	10.827
2	.0201	.0404	.103	.211	.446	.713	1.386	2.468	3.219	4.605	5.991	7.824	9.210	13.815
3	.115	.185	.352	.584	1.005	1.424	2.366	3.665	4.642	6.251	7.815	9.837	11.345	16.266
4	.297	.429	.711	1.064	1.649	2.195	3.357	4.878	5.989	7.779	9.488	11.668	13.277	19.467
5	.554	.752	1.145	1.610	2.343	3.000	4.351	6.064	7.289	9.236	11.070	13.388	15.086	20.515
6	.872	1.134	1.635	2.204	3.070	3.828	5.348	7.231	8.558	10.645	12.592	15.033	16.812	22.457
7	1.239	1.564	2.167	2.833	3.822	4.671	6.346	8.383	9.803	12.017	14.067	16.622	18.475	24.322
8	1.646	2.032	2.733	3.490	4.594	5.527	7.344	9.524	11.030	13.362	15.507	18.168	20.090	26.125
9	2.088	2.532	3.325	4.168	5.380	6.393	8.343	10.656	12.242	14.684	16.919	19.679	21.666	27.877
10	2.558	3.059	3.940	4.865	6.179	7.267	9.342	11.781	13.442	15.987	18.307	21.161	23.209	29.588
11	3.053	3.609	4.575	5.578	6.989	8.148	10.341	12.899	14.631	17.275	19.675	22.618	24.725	31.264
12	3.571	4.178	5.226	6.304	7.807	9.034	11.340	14.011	15.812	18.549	21.026	24.054	26.217	32.909
13	4.107	4.765	5.892	7.042	8.634	9.926	12.340	15.119	16.985	19.812	22.362	25.472	27.688	34.528
14	4.660	5.368	6.571	7.790	9.467	10.821	13.339	16.222	18.151	21.064	23.685	26.873	29.141	36.123
15	5.229	5.985	7.261	8.547	10.307	11.721	14.339	17.322	19.311	22.307	24.996	28.259	30.578	37.697
16	5.812	6.614	7.962	9.312	11.152	12.624	15.338	18.418	20.465	23.542	26.226	29.633	32.000	39.252
17	6.408	7.255	8.612	10.085	12.002	13.531	16.338	19.511	21.615	24.769	27.587	30.995	33.409	40.776
18	7.015	7.906	9.336	10.865	12.857	14.440	17.338	20.601	22.760	25.989	28.869	32.346	34.805	42.312
19	7.633	8.567	10.117	11.651	13.716	15.352	18.338	21.689	23.900	27.204	30.144	33.687	36.191	43.820
20	8.260	9.237	10.851	12.443	14.578	16.266	19.337	22.775	25.038	28.412	31.410	35.020	37.566	45.315
21	8.897	9.915	11.591	13.240	15.445	17.182	20.337	23.858	26.171	29.615	32.671	36.343	38.932	46.791
22	9.542	10.600	12.338	14.041	16.314	18.101	21.337	24.939	27.301	30.813	33.924	37.659	40.289	48.268

For larger values of *df*, the expression $\sqrt{\chi^2} \sim \sqrt{2df} - 1$ may be used as a normal deviate with unit variance, remembering that the probability for χ^2 corresponds with that of a single tail of the normal curve.

This table is adapted from R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, Oliver and Boyd, Ltd., Edinburgh, by permission of the authors and publishers. (Continued)

Table 8 Distribution of Chi-Square for Given Probability Levels (Continued)

<i>df</i>	Probability													
	.99	.98	.95	.90	.80	.70	.50	.30	.20	.10	.05	.02	.01	.001
23	10.1%	11.293	13.091	14.848	17.187	19.021	22.337	26.018	28.429	32.007	35.172	38.968	41.638	49722
24	10.856	11.992	13.848	15.659	18.062	19.943	23.337	27.096	29.553	33.1%	36.415	40.270	42.980	51.179
25	11.524	12.697	14.611	16.473	18.940	20.867	24.337	28.172	30.675	34.382	37.652	41.566	44.314	52.620
26	12.198	13.409	15.379	17.292	19.820	21.792	25.336	29.246	31.795	35.363	38.815	42.8%	45.642	54.052
27	12.879	14.125	16.151	18.114	20.703	22.719	26.336	30.319	32.912	36.741	40.113	44.140	46.963	55.476
28	13.565	14.847	16.928	18.939	21.588	23.647	27.336	31.391	34.027	37.916	41.337	45.419	48.278	56.893
29	14.256	15.574	17.708	19.768	22.475	24.577	28.336	32.461	35.139	39.087	42.557	46.693	49.588	58.302
30	14.953	16.306	18.493	20.599	23.364	25.508	29.336	33.530	36.250	40.256	43.773	47.962	50.892	59.703
32	16.362	17.783	20.072	22.271	25.148	27.373	31.336	35.665	38.466	42.585	46.194	50.487	53.486	62.487
34	17.789	19.275	21.664	23.952	26.938	29.242	33.336	37.795	40.676	44.903	48.602	52.995	56.061	65.247
36	19.233	20.783	23.269	25.643	28.735	31.115	35.336	39.922	42.879	47.212	50.999	55.489	58.619	67.985
38	20.691	22.304	24.884	27.343	30.537	32.992	37.335	42.045	45.076	49.513	53.384	57.969	61.162	70.703
40	22.164	23.838	26.509	29.051	32.345	34.872	39.335	44.165	47.269	51.805	55.759	60.436	63.691	73.402
42	23.650	25.383	28.144	30.765	34.157	36.755	41.335	46.282	49.436	54.090	58.124	62.892	66.206	76.084
44	25.148	26.939	29.787	32.487	35.974	38.641	43.335	48.3%	51.639	56.369	60.481	65.337	68.710	78.730
46	26.657	28.504	31.439	34.215	37.795	40.529	45.335	50.507	53.818	58.641	62.830	67.771	71.201	81.400
48	28.177	30.080	33.098	35.949	39.621	42.420	47.335	52.616	55.993	60.907	65.171	70.197	73.683	84.037
50	29.707	31.664	34.764	37.689	41.449	44.313	49.335	54.723	58.164	63.167	67.505	72.613	76.154	86.661
52	31.246	33.256	36.437	39.433	43.281	46.209	51.335	56.827	60.332	65.422	69.832	75.021	78.616	89.272
54	32.793	34.856	38.116	41.183	45.117	48.106	53.335	58.930	62.4%	67.673	72.153	77.422	81.069	91.872
56	34.350	36.464	39.801	42.937	46.955	50.005	55.335	61.031	64.658	69.919	74.468	79.815	83.513	94.461
58	35.913	38.078	41.492	44.696	48.797	51.906	57.335	63.129	66.816	72.160	76.778	82.201	83.930	97.039
60	37.485	39.699	43.188	46.459	50.641	53.809	59.335	65.227	68.972	74.397	79.082	84.580	88.379	99.607
62	39.063	41.327	44.889	48.226	52.487	55.714	61.335	67.322	71.125	76.630	81.381	86.953	90.802	102.166
64	40.649	42.960	46.595	49.996	54.336	57.620	63.335	69.416	73.276	78.860	83.675	89.320	93.217	104.716
66	42.240	44.599	48.305	51.770	56.188	59.527	65.335	71.508	75.424	81.085	85.965	91.681	95.626	107.258
68	43.838	46.244	50.020	53.548	58.042	61.436	67.335	73.600	77.571	83.308	88.230	94.037	98.028	109.791
70	45.442	-47.893	51.739	55.329	59.898	63.346	69.334	75.689	79.715	85.527	90.531	96.388	100.425	112.317

Table 9 The F-Distribution* (.05 Level)

d_f	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	161.4	9.5	5.7	4.5	3.8	3.3	2.9	2.7	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5
2	19.0	9.0	5.0	3.8	3.2	2.8	2.4	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0
3	10.1	9.5	5.2	3.9	3.3	2.9	2.5	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1
4	7.7	9.4	5.3	4.0	3.4	3.0	2.6	2.4	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2
5	6.6	9.3	5.4	4.1	3.5	3.1	2.7	2.5	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3
6	6.0	9.2	5.5	4.2	3.6	3.2	2.8	2.6	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4
7	5.6	9.1	5.6	4.3	3.7	3.3	2.9	2.7	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5
8	5.3	9.0	5.7	4.4	3.8	3.4	3.0	2.8	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6
9	5.1	8.9	5.8	4.5	3.9	3.5	3.1	2.9	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7
10	4.9	8.8	5.9	4.6	4.0	3.6	3.2	3.0	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8
12	4.6	8.6	6.1	4.8	4.2	3.8	3.4	3.2	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0
15	4.3	8.4	6.3	5.0	4.4	4.0	3.6	3.4	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2
20	4.0	8.1	6.5	5.3	4.6	4.2	3.8	3.6	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4
24	3.8	7.9	6.7	5.6	4.8	4.4	4.0	3.8	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6
30	3.6	7.7	6.9	5.8	5.0	4.6	4.2	4.0	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8
40	3.4	7.4	7.2	6.1	5.3	4.9	4.5	4.3	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1
60	3.2	7.1	7.5	6.4	5.6	5.2	4.8	4.6	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.4
120	3.0	6.8	7.8	6.7	5.9	5.5	5.1	4.9	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	3.9	3.8	3.7
∞	2.9	6.6	8.0	6.9	6.1	5.7	5.3	5.1	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	3.9

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Table 9 The F-Distribution * (.01 Level) (Continued)

$d.f.$	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	152	4999.5	403	5625	5764	5859	5928	5982	6022	6056	106	6157	100	235	6261	237	6313	6339	6366
2	965	99.0	99.17	99.25	99.30	99.33	99.38	99.41	99.43	99.44	99.42	99.43	99.43	99.43	99.43	99.43	99.43	99.43	99.43
3	34.12	30.8	29.46	28.71	28.24	27.9	27.67	27.41	27.35	27.21	27.05	26.87	26.61	26.40	26.5	26.41	26.32	26.22	26.13
4	21.20	18.0	16.69	15.90	15.52	15.2	14.98	14.84	14.66	14.5	14.37	14.2	14.0	13.93	13.84	13.75	13.65	13.56	13.46
5	16.26	13.27	12.06	11.39	10.97	10.61	10.46	10.25	10.16	10.01	9.89	9.73	9.55	9.47	9.38	9.29	9.20	9.11	9.02
6	13.75	10.92	9.78	9.15	8.75	8.41	8.26	8.10	8.02	7.87	7.72	7.66	7.48	7.41	7.32	7.23	7.14	7.06	6.97
7	12.25	9.55	8.45	7.85	7.46	7.15	6.99	6.81	6.72	6.57	6.42	6.31	6.14	6.07	5.98	5.91	5.82	5.74	5.65
8	11.26	8.65	7.59	7.01	6.63	6.31	6.18	6.03	5.91	5.76	5.61	5.49	5.32	5.28	5.20	5.12	5.03	4.95	4.86
9	10.56	8.02	6.99	6.42	6.04	5.72	5.61	5.47	5.35	5.21	5.06	4.96	4.81	4.73	4.65	4.57	4.48	4.40	4.31
10	10.04	7.50	6.55	5.99	5.61	5.30	5.19	5.06	4.94	4.80	4.65	4.56	4.41	4.33	4.25	4.17	4.08	4.00	3.91
11	9.63	7.21	6.22	5.67	5.30	5.00	4.89	4.74	4.63	4.50	4.35	4.25	4.10	4.02	3.94	3.86	3.79	3.69	3.61
12	933	693	595	5.41	5.04	4.74	4.64	4.50	4.39	4.26	4.11	4.01	3.86	3.78	3.70	3.62	3.54	3.45	3.36
13	9.07	6.70	5.74	5.21	4.84	4.54	4.44	4.30	4.19	4.06	3.91	3.82	3.66	3.59	3.51	3.43	3.34	3.25	3.17
14	8.86	6.51	5.56	5.04	4.67	4.37	4.28	4.14	4.03	3.90	3.75	3.66	3.51	3.43	3.35	3.27	3.18	3.09	3.00
15	em	6.36	5.42	4.90	4.53	4.23	4.14	4.00	3.89	3.76	3.61	3.52	3.37	3.29	3.21	3.13	3.05	2.96	2.87
16	8.40	en	5.29	4.77	4.40	4.10	4.01	3.87	3.76	3.63	3.48	3.39	3.24	3.16	3.08	3.00	2.92	2.84	2.76
17	8.29	6011	5.18	4.67	4.30	4.00	3.91	3.77	3.66	3.53	3.38	3.29	3.14	3.06	2.98	2.90	2.82	2.74	2.66
18	8.18	5.93	5.09	4.58	4.21	3.91	3.82	3.68	3.57	3.44	3.29	3.20	3.05	2.97	2.89	2.81	2.73	2.65	2.57
19	8.10	5.85	5.01	4.50	4.13	3.83	3.74	3.60	3.49	3.36	3.21	3.12	2.97	2.89	2.81	2.73	2.65	2.57	2.49
20	8.02	5.78	4.94	4.43	4.06	3.76	3.67	3.53	3.42	3.29	3.14	3.05	2.90	2.82	2.74	2.66	2.58	2.50	2.42
21	7.95	5.72	4.87	4.37	3.99	3.70	3.61	3.47	3.36	3.23	3.08	2.99	2.84	2.76	2.68	2.60	2.52	2.44	2.36
22	7.88	5.65	4.82	4.31	3.94	3.65	3.56	3.42	3.31	3.18	3.03	2.94	2.79	2.71	2.63	2.55	2.47	2.39	2.31
23	7.81	5.59	4.76	4.25	3.88	3.59	3.50	3.36	3.25	3.12	2.97	2.88	2.73	2.65	2.57	2.49	2.41	2.33	2.25
24	7.74	5.53	4.72	4.21	3.84	3.55	3.46	3.32	3.21	3.08	2.93	2.84	2.69	2.61	2.53	2.45	2.37	2.29	2.21
25	7.67	5.47	4.66	4.15	3.78	3.49	3.40	3.26	3.15	3.02	2.87	2.78	2.63	2.55	2.47	2.39	2.31	2.23	2.15
26	7.60	5.41	4.60	4.09	3.72	3.43	3.34	3.20	3.09	2.96	2.81	2.72	2.57	2.49	2.41	2.33	2.25	2.17	2.09
27	7.53	5.35	4.54	4.03	3.66	3.37	3.28	3.14	3.03	2.90	2.75	2.66	2.51	2.43	2.35	2.27	2.19	2.11	2.03
28	7.46	5.29	4.48	3.97	3.60	3.31	3.22	3.08	2.97	2.84	2.69	2.60	2.45	2.37	2.29	2.21	2.13	2.05	1.97
29	7.39	5.23	4.42	3.91	3.54	3.25	3.16	3.02	2.91	2.78	2.63	2.54	2.39	2.31	2.23	2.15	2.07	1.99	1.91
30	7.32	5.17	4.36	3.85	3.48	3.19	3.10	2.96	2.85	2.72	2.57	2.48	2.33	2.25	2.17	2.09	2.01	1.93	1.85
40	7.11	5.01	4.20	3.69	3.32	3.03	2.94	2.80	2.69	2.56	2.41	2.32	2.17	2.09	2.01	1.93	1.85	1.77	1.69
60	6.90	4.85	4.04	3.53	3.16	2.87	2.78	2.64	2.53	2.40	2.25	2.16	2.01	1.93	1.85	1.77	1.69	1.61	1.53
120	6.69	4.69	3.88	3.37	3.00	2.71	2.62	2.48	2.37	2.24	2.09	2.00	1.85	1.77	1.69	1.61	1.53	1.45	1.37

Table 10 Critical values of the Studentized range statistic*

		<i>k</i> = number of means or steps between ordered means								
<i>df</i> for S_e^2	$1 - \alpha$	2	3	4	5	6	7	8	9	10
1	.95	18.0	27.0	32.8	37.1	40.4	43.1	45.4	47.4	49.1
	.99	90.0	135	164	186	202	216	227	237	246
2	.95	6.09	8.3	9.8	10.9	11.7	12.4	13.0	13.5	14.0
	.99	14.0	19.0	22.3	24.7	26.6	28.2	29.5	30.7	31.7
3	.95	4.50	5.91	6.82	7.50	8.04	8.48	8.85	9.18	9.46
	.99	8.26	10.6	12.2	13.3	14.2	15.0	15.6	16.2	16.7
4	.95	3.93	5.04	5.76	6.29	6.71	7.05	7.35	7.60	7.83
	.99	6.51	8.12	9.17	9.96	10.6	11.1	11.5	11.9	12.3
5	.95	3.64	4.60	5.22	5.67	6.03	6.33	6.58	6.80	6.99
	.99	5.70	6.97	7.80	8.42	8.91	9.32	9.67	9.97	10.2
6	.95	3.46	4.34	4.90	5.31	5.63	5.89	6.12	6.32	6.49
	.99	5.24	6.33	7.03	7.56	7.97	8.32	8.61	8.87	9.10
7	.95	3.34	4.16	4.69	5.06	5.36	5.61	5.82	6.00	6.16
	.99	4.95	5.92	6.54	7.01	7.37	7.68	7.94	8.17	8.37
8	.95	3.26	4.04	4.53	4.89	5.17	5.40	5.60	5.77	5.92
	.99	4.74	5.63	6.20	6.63	6.96	7.24	7.47	7.68	7.87
9	.95	3.20	3.95	4.42	4.76	5.02	5.24	5.43	5.60	5.74
	.99	4.60	5.43	5.96	6.35	6.66	6.91	7.13	7.32	7.49
10	.95	3.15	3.88	4.33	4.65	4.91	5.12	5.30	5.46	5.60
	.99	4.48	5.27	5.77	6.14	6.43	6.67	6.87	7.05	7.21
11	.95	3.11	3.82	4.26	4.57	4.82	5.03	5.20	5.35	5.49
	.99	4.39	5.14	5.62	5.97	6.25	6.48	6.67	6.84	6.99
12	.95	3.08	3.77	4.20	4.51	4.75	4.95	5.12	5.27	5.40
	.99	4.32	5.04	5.50	5.84	6.10	6.32	6.51	6.67	6.81
13	.95	3.06	3.73	4.15	4.45	4.69	4.88	5.05	5.19	5.32
	.99	4.26	4.96	5.40	5.73	5.98	6.19	6.37	6.53	6.67
14	.95	3.03	3.70	4.11	4.41	4.64	4.83	4.99	5.13	5.25
	.99	4.21	4.89	5.32	5.63	5.88	6.08	6.26	6.41	6.54
16	.95	3.00	3.65	4.05	4.33	4.56	4.74	4.90	5.03	5.15
	.99	4.13	4.78	5.19	5.49	5.72	5.92	6.08	6.22	6.35
18	.95	2.97	3.61	4.00	4.28	4.49	4.67	4.82	4.96	5.07
	.99	4.07	4.70	5.09	5.38	5.60	5.79	5.94	6.08	6.20
20	.95	2.95	3.58	3.96	4.23	4.45	4.62	4.77	4.90	5.01
	.99	4.02	4.64	5.02	5.29	5.51	5.69	5.84	5.97	6.09
24	.95	2.92	3.53	3.90	4.17	4.37	4.54	4.68	4.81	4.92
	.99	3.96	4.54	4.91	5.17	5.37	5.54	5.69	5.81	5.92
30	.95	2.89	3.49	3.84	4.10	4.30	4.46	4.60	4.72	4.83
	.99	3.89	4.45	4.80	5.05	5.24	5.40	5.54	5.66	5.76
40	.95	2.86	3.44	3.79	4.04	4.23	4.39	4.52	4.63	4.74
	.99	3.82	4.37	4.70	4.93	5.11	5.27	5.39	5.50	5.60
60	.95	2.83	3.40	3.74	3.98	4.16	4.31	4.44	4.55	4.65
	.99	3.76	4.28	4.60	4.82	4.99	5.13	5.25	5.36	5.45
120	.95	2.80	3.36	3.69	3.92	4.10	4.24	4.36	4.48	4.56
	.99	3.70	4.20	4.50	4.71	4.87	5.01	5.12	5.21	5.30
∞	.95	2.77	3.31	3.63	3.86	4.03	4.17	4.29	4.39	4.47
	.99	3.64	4.12	4.40	4.60	4.76	4.88	4.99	5.08	5.16

This table is abridged from Table II.2 in *The probability integrals of the range and of the Studentized range*, prepared by H. Leon Harter, Donald S. Clemm, and Eugene H. Guthrie. These tables are published in WADC tech. Rep. 58-484, vol. 2, 1959, Wright Air Development Center, and are reproduced with the kind permission of the authors.

Table 11 Table of Random Numbers*

Row	Column number																																ROW	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
1	278940723	2	5	4	2	6	7	16	8	5	9	13	5	4	0	3	6	6	7	6	5	1												
2	226041773	8	7	3	6	7	9	4	2	13	8	9	0	3	4	9	0	2	6	3	0	9	8											
3	916639491	0	5	15	2	2	7	5	2	5	3	4	13	9	5	8	13	8	2	9	2	3												
4	7 0 5 5 9	2	7	5	7	8	0	8	8	5	0	6	0	5	9	0	5	7	4	5	2	0	6	1	6	4	2	0						
5	473663982	17	9	7	6	4	2	4	9	6	0	3	6	3	5	3	9	9	18	5	13													
6	820287760	2	2	3	11	6	4	8	5	2	2	3	4	2	2	6	5	2	2	4	9	6												
7	087533642	6	8	3	16	5	0	0	5	5	7	8	10	12	9	14	3	4	7	6														
8	941908466	8	6	3	3	2	3	7	4	7	5	15	7	6	3	7	9	4	5	5	3	5	8											
9	500674000	19	5	9	9	18	14	7	4	9	8	7	2	4	3	0	8	6	4	2	7	9												
10	195415262	9	4	11	5	8	4	4	4	6	1	8	7	8	6	4	7	4	4	0	5	8	10											
11	564418728	3	6	15	9	8	6	2	2	9	1	9	0	4	8	10	13	5	3	4	4													
12	792519793	18	6	8	7	7	6	6	5	0	3	8	1	12	4	7	8	9	17	5	2	12												
13	333595140	8	2	5	6	3	5	4	6	5	7	2	6	7	8	9	9	8	0	9	15	13												
14	190400995	7	4	15	9	4	7	6	4	8	2	6	4	4	18	8	15	4	3	8	0	14												
15	5 4 7 2 0 3 7 9	10	9	6	2	9	7	4	7	6	1	1	6	12	2	9	5	8	4	4	8	6	15											
16	298255932	0	4	9	0	6	4	4	2	15	7	3	6	5	5	4	5	7	9	6	4	0	16											
17	976267733	3	17	5	0	9	6	11	3	9	2	1	1	0	0	13	7	7	3	7	3	17												
18	582433085	3	5	7	5	8	3	5	9	3	4	5	4	6	3	9	2	7	114	913	18													
19	434950362	9	7	4	6	2	5	6	9	8	3	6	14	0	3	5	9	7	18	0	6	9	19											
20	1 1 9 8 4 8 0 6 7 0 9 7 9 6 9 9 4 0 6 0 0 5 9 6 5 1 4 2 0 4 1 9 2 0																					0												
21	691833759	6	6	7	7	6	0	4	5	3	4	5	7	3	0	6	10	3	0	0	3	5	0	21										
22	700381347	9	5	2	6	9	9	7	3	2	5	0	2	3	5	3	9	7	4	8	9	4	15	22										
23	372081569	0	17	8	9	6	6	6	0	7	8	1	9	6	7	4	8	9	6	3	6	5	123											

*This table is reprinted from J. G. Peatman's and R. Schafer's "A Table of Random Numbers from Selective Service Numbers," copyright 1942 by *Jour. Psychol.*, 14296297, and used by permission of the authors and editor.

Table 11 (Continued)

24	270006506	5 6 0 3 2 9 3 17 2 2 8 4 9 0 4 3 2 4 5 5 1 2	24
25	307078494	2 8 2 4 7 4 9 6 0 4 3 8 17 7 0 9 8 4 6 3 12	25
26	629331775	2 2 3 4 6 4 2 2 4 7 5 4 4 4 1 7 1 6 7 12 6 8	26
27	549214857	0 9 6 4 7 2 18 9 7 6 13 3 4 6 6 5 9 0 7 0 3	27
28	037017380	3 6 2 3 1 0 9 5 2 5 9 2 0 2 8 7 7 2 0 2 7 2	28
29	936622097	2 3 9 2 8 7 3 10 7 0 8 9 3 8 8 5 3 13 10 9	29
30	295699569	8 2 8 0 0 4 4 8 8 5 7 2 13 4 9 5 2 6 8 3 6 6	30
31	857292659	3 9 7 1 8 3 5 6 6 1 2 1 5 5 5 6 1 7 1 5 7 5 9	31
32	845779951	4 5 5 0 9 5 3 13 9 3 7 8 14 0 5 4 15 4 4 0	32
33	879818414	3 7 7 0 9 19 4 6 13 8 6 5 9 2 2 8 16 9 0 1	33
34	732518.632	8 5 8 6 9 3 4 5 2 6 19 0 6 9 0 5 4 6 8 0 3 2	34
35	899018889.5	7 5 0 4 11 6 0 3 13 0 3 5 8 9 2 7 8 8 7 1	35
36	029788176	16 7 6 4 2 5 0 5 8 3 2 4 7 7 2 2 6 2 6 8 6 0	36
37	052323818	8 16 2 3 0 7 3 0 12 6 2 6 8 3 7 4 4 3 8 9 9	37
38	226816962	6 7 9 17 8 0 2 4 8 0 4 7 3 3 8 4 4 8 4 3 8	38
39	078495880	7 2 18 17 5 3 0 7 4 10 3 2 0 12 8 6 5 9 4	39
40	4807059.94	9 6 9 8 2 0 6 4 0 7 8 11 4 2 16 7 0 7 3 12	40
41	920167283	3 9 8 8 3 4 7 8 4 0 5 16 8 7 8 3 5 4 5 0 6	41
42	088340922	8 8 1 5 0 4 8 2 6 2 9 2 19 8 5 3 10 7 8 5 3	42
43	206975282	5 5 5 4 0 7 7 17 8 6 8 5 13 7 8 2 7 1 9 3 6	43
44	318668356	3 2 7 4 1 8 8 2 5 6 8 0 6 4 6 4 10 9 1 9 8	44
45	008661750	8 5 6 5 0 8 2 7 11 6 3 4 6 0 0 9 4 7 9 2 4	45
46	332994253	3 8 2 4 2 2 6 2 5 2 9 0 13 7 6 3 9 14 6 0 1	46
47	847404512	10 4 2 5 7 7 9 4 6 6 5 8 3 3 8 10 3 7 7 8 6	47
48	24302072	4 3 0 2 0 7 2 0 8 0 8 4 1 6 9 7 5 13 6 7 7 5	48
49	465630452	0 1 5 2 4 7 9 9 3 0 2 2 16 11 0 0 9 9 1 7 7	49
50	348345875	9 7 16 3 9 0 9 0 9 0 4 2 5 8 9 5 3 3 3 2 0	50

Table 12 ตารางเลขคู่

10480	15011	01536	02011	81647	91646	69179	14194	62590	36207	20969	99570	91290	90700
22368	46573	25595	85393	30995	89198	27982	53402	93965	34095	52666	19174	39615	99505
24130	48360	22527	97265	76393	64809	15179	24830	49340	32081	30680	19655	63348	58629
42167	93093	06243	61680	07856	16376	39440	53537	71341	57004	00849	74917	97758	16379
37570	39975	81837	16656	06121	91782	60468	81305	49684	60612	14110	06927	01263	54613
71921	06907	11008	42751	27756	53498	18602	70659	90655	15053	21916	81825	44394	42880
99562	72905	56420	69994	98872	31016	71194	18738	44013	48840	63213	21069	10634	12952
96301	91977	05463	07972	18876	20922	94595	56869	69014	60045	18425	84903	42508	32307
89579	14342	63661	10281	17453	18103	57740	84378	25331	12566	58678	44947	05585	56941
85475	36857	53342	53988	53060	59533	38867	62300	08158	17983	16439	11458	18593	64952
28918	69578	88231	33267	70997	79936	56865	05859	90106	31595	01547	85590	91610	78188
63553	40961	48235	03427	49626	69445	18663	72695	52180	20847	12234	90511	33703	90322
09429	93969	52636	92137	88947	33488	36320	17617	30015	08272	84115	271%	30613	74952
10365	61129	85729	85689	48237	52267	67689	93394	01511	26358	85104	20285	29975	89868
07119	97336	71048	08178	77233	13916	47564	81056	97735	85977	29312	74461	28551	90707
51085	12765	51821	51259	77452	16308	60756	92144	49442	53900	70960	63990	75601	40719
02368	21382	52404	60268	89368	19885	55322	44819	01188	65255	64835	44919	05944	55157
01011	54092	33362	94904	31273	04146	18594	29852	71585	85030	51132	01915	92747	64951
52162	53916	46369	58586	23216	14513	83149	98736	23495	64350	94738	17752	25156	35749
07056	97628	33787	09998	42698	06691	76988	13602	51851	46104	88916	19509	25625	38104
48663	91245	85828	14346	09172	30168	90229	04734	59193	22178	30421	61666	99904	32812
54164	58492	22421	74103	47070	25306	76168	26384	58151	06646	21524	15227	96909	44592
32639	32363	05597	24200	13363	38005	94342	28728	35806	06912	17012	64161	18296	22851
29334	27001	87637	87308	58731	00256	45834	15398	46557	41135	10367	07684	36188	18510
02488	33062	28834	07351	19731	92420	60952	61280	50001	67658	32586	86679	50720	94953
81525	72295	04839	96423	24878	82651	66566	14778	76797	14780	13300	87074	79666	95725
29676	20591	68086	26432	46901	20849	89768	81536	86645	12659	92259	57102	80428	25280
Gi1742	57392	39064	66432	a4673	40027	32832	61362	98947	96067	64760	64584	96096	98253
05366	04213	25669	26422	44407	44048	37937	63904	45766	66134	75470	66520	34693	90449
91921	26418	64117	94305	26766	25940	39972	22209	71500	64568	91402	42416	07844	69618
00582	04711	87917	77341	42206	35126	74087	99547	81817	42607	43808	76655	62028	76630
00725	69884	62797	56170	86324	88072	76222	36086	84637	93161	76038	65855	77917	88006
69011	65795	95876	55293	18988	27354	26575	08625	40801	59920	29841	80150	12777	48501
25916	57948	29888	88604	61917	48708	18912	82271	65424	69774	33611	54262	85963	03547
09763	a3473	73577	12908	30883	18317	28290	35797	05998	41688	34952	37888	38917	88050
91567	42595	27958	30134	04024	86385	29880	99730	55536	84855	29080	09250	79656	73211
17955	56349	90999	49127	20044	59931	06115	20542	18059	02008	73708	83517	36103	42791
46503	18584	18845	49618	02304	51038	20655	58727	28168	15475	56942	53389	20562	87338
92157	89637	94824	78171	84610	82834	09922	25417	44137	48413	25555	21246	35509	20468
14577	62765	35605	81263	39667	47358	56873	56307	61607	49518	89656	20103	77490	18062
98427	07523	33362	64270	01638	92477	66967	98420	04880	45585	46565	04102	46880	45709
34914	63976	a8720	82765	34476	17032	87589	40836	32427	10002	70663	88863	77775	69348
70060	28277	38475	46473	23219	53416	94970	25832	69975	94884	19661	72828	00102	66794
53976	54914	06990	67245	68350	82948	11398	42878	80287	88267	47363	46634	06541	97809
76012	29515	40980	07391	58745	25774	22987	80059	39911	96189	41151	14222	60697	59583
90725	52210	a3974	29992	65831	38857	50490	83765	55657	14361	31720	57375	56228	41546
64364	67412	33339	31926	14883	24413	59744	92351	97473	89286	35931	04110	23736	51900
08962	00358	31662	25388	61642	34072	81249	35648	56891	69352	48373	45578	78547	81788
95012	68379	93526	70165	10592	04542	76463	54328	02349	17247	28865	14777	62730	92277
15664	10493	20492	38391	91132	21999	59516	81652	27195	48223	46751	22923	32261	85653
16408	81899	04153	53381	79401	21438	83035	92350	36693	31238	59649	91754	72772	02338
18629	81953	05520	91962	04739	13092	97662	24822	94730	06496	35090	04822	86774	98289
73115	35101	47498	87637	99016	71060	88824	71013	18735	20286	23153	72924	35165	43040
57491	16703	23167	49323	45021	33132	12544	41035	80780	45993	44812	12515	98931	91202
30405	83946	23792	14422	15059	45799	22716	19792	09983	74353	68668	30429	70735	25499
16631	35006	85900	98275	32388	52390	16815	69298	82732	38480	73817	32523	41961	44437
96773	20206	42559	78985	05300	22164	24369	54224	35083	19687	11052	91491	60383	19746
38935	64202	14349	82674	66523	44133	00697	35552	35970	19124	63318	29686	03387	59846
31624	77384	17403	53363	44167	64486	64758	75366	76554	31601	12614	33072	60332	02325
78919	19474	23632	27889	47914	02584	37680	20801	72152	39339	34806	08930	85001	87820