

TABLE A.4 Studentized Range Statistic (*Q*)

		K = NUMBER OF MEANS OR NUMBER OF STEPS BETWEEN ORDERED MEANS									
ERROR <i>df</i> (<i>df</i> WITHIN)	α	2	3	4	5	6	7	8	9	10	11
5	.05	3.64	4.60	5.22	5.67	6.03	6.33	6.58	6.80	6.99	7.17
	.01	5.70	6.98	7.80	8.42	8.91	9.32	9.67	9.97	10.24	10.48
6	.05	3.46	4.34	4.90	5.30	5.63	5.90	6.12	6.32	6.49	6.65
	.01	5.24	6.33	7.03	7.56	7.97	8.32	8.61	8.87	9.10	9.30
7	.05	3.34	4.16	4.68	5.06	5.36	5.61	5.82	6.00	6.16	6.30
	.01	4.95	5.92	6.54	7.01	7.37	7.68	7.94	8.17	8.37	8.55
8	.05	3.26	4.04	4.53	4.89	5.17	5.40	5.60	5.77	5.92	6.05
	.01	4.75	5.64	6.20	6.62	6.96	7.24	7.47	7.68	7.86	8.03
9	.05	3.20	3.95	4.41	4.76	5.02	5.24	5.43	5.59	5.74	5.87
	.01	4.60	5.43	5.96	6.35	6.66	6.91	7.13	7.33	7.49	7.65
10	.05	3.15	3.88	4.33	4.65	4.91	5.12	5.30	5.46	5.60	5.72
	.01	4.48	5.27	5.77	6.14	6.43	6.67	6.87	7.05	7.21	7.36
11	.05	3.11	3.82	4.26	4.57	4.82	5.03	5.20	5.35	5.49	5.61
	.01	4.39	5.15	5.62	5.97	6.25	6.48	6.67	6.84	6.99	7.13
12	.05	3.08	3.77	4.20	4.51	4.75	4.95	5.12	5.27	5.39	5.51
	.01	4.32	5.05	5.50	5.84	6.10	6.32	6.51	6.67	6.81	6.94
13	.05	3.06	3.73	4.15	4.45	4.69	4.88	5.05	5.19	5.32	5.43
	.01	4.26	4.96	5.40	5.73	5.98	6.19	6.37	6.53	6.67	6.79
14	.05	3.03	3.70	4.11	4.41	4.64	4.83	4.99	5.13	5.25	5.36
	.01	4.21	4.89	5.32	5.63	5.88	6.08	6.26	6.41	6.54	6.66
15	.05	3.01	3.67	4.08	4.37	4.59	4.78	4.94	5.08	5.20	5.31
	.01	4.17	4.84	5.25	5.56	5.80	5.99	6.16	6.31	6.44	6.55
16	.05	3.00	3.65	4.05	4.33	4.56	4.74	4.90	5.03	5.15	5.26
	.01	4.13	4.79	5.19	5.49	5.72	5.92	6.08	6.22	6.35	6.46
17	.05	2.98	3.63	4.02	4.30	4.52	4.70	4.86	4.99	5.11	5.21
	.01	4.10	4.74	5.14	5.43	5.66	5.85	6.01	6.15	6.27	6.38
18	.05	2.97	3.61	4.00	4.28	4.49	4.67	4.82	4.96	5.07	5.17
	.01	4.07	4.70	5.09	5.38	5.60	5.79	5.94	6.08	6.20	6.31
19	.05	2.96	3.59	3.98	4.25	4.47	4.65	4.79	4.92	5.04	5.14
	.01	4.05	4.67	5.05	5.33	5.55	5.73	5.89	6.02	6.14	6.25
20	.05	2.95	3.58	3.96	4.23	4.45	4.62	4.77	4.90	5.01	5.11
	.01	4.02	4.64	5.02	5.29	5.51	5.69	5.84	5.97	6.09	6.19
24	.05	2.92	3.53	3.90	4.17	4.37	4.54	4.68	4.81	4.92	5.01
	.01	3.96	4.55	4.91	5.17	5.37	5.54	5.69	5.81	5.92	6.02
30	.05	2.89	3.49	3.85	4.10	4.30	4.46	4.60	4.72	4.82	4.92
	.01	3.89	4.45	4.80	5.05	5.24	5.40	5.54	5.65	5.76	5.85
40	.05	2.86	3.44	3.79	4.04	4.23	4.39	4.52	4.63	4.73	4.82
	.01	3.82	4.37	4.70	4.93	5.11	5.26	5.39	5.50	5.60	5.69
60	.05	2.83	3.40	3.74	3.98	4.16	4.31	4.44	4.55	4.65	4.73
	.01	3.76	4.28	4.59	4.82	4.99	5.13	5.25	5.36	5.45	5.53
120	.05	2.80	3.36	3.68	3.92	4.10	4.24	4.36	4.47	4.56	4.64
	.01	3.70	4.20	4.50	4.71	4.87	5.01	5.12	5.21	5.30	5.37
∞	.05	2.77	3.31	3.63	3.86	4.03	4.17	4.29	4.39	4.47	4.55
	.01	3.64	4.12	4.40	4.60	4.76	4.88	4.99	5.08	5.16	5.23

(continued)

TABLE A.4 Studentized Range Statistic (Q)

K = NUMBER OF MEANS OR NUMBER OF STEPS BETWEEN ORDERED MEANS										α	ERROR df (df WITHIN)
12	13	14	15	16	17	18	19	20			
7.32	7.47	7.60	7.72	7.83	7.93	8.03	8.12	8.21	.05	5	
10.70	10.89	11.08	11.24	11.40	11.55	11.68	11.81	11.93	.01		
6.79	6.92	7.03	7.14	7.24	7.34	7.43	7.51	7.59	.05	6	
9.48	9.65	9.81	9.95	10.08	10.21	10.32	10.43	10.54	.01		
6.43	6.55	6.66	6.76	6.85	6.94	7.02	7.10	7.17	.05	7	
8.71	8.86	9.00	9.12	9.24	9.35	9.46	9.55	9.65	.01		
6.18	6.29	6.39	6.48	6.57	6.65	6.73	6.80	6.87	.05	8	
8.18	8.31	8.44	8.55	8.66	8.76	8.85	8.94	9.03	.01		
5.98	6.09	6.19	6.28	6.36	6.44	6.51	6.58	6.64	.05	9	
7.78	7.91	8.03	8.13	8.23	8.33	8.41	8.49	8.57	.01		
5.83	5.93	6.03	6.11	6.19	6.27	6.34	6.40	6.47	.05	10	
7.49	7.60	7.71	7.81	7.91	7.99	8.08	8.15	8.23	.01		
5.71	5.81	5.90	5.98	6.06	6.13	6.20	6.27	6.33	.05	11	
7.25	7.36	7.46	7.56	7.65	7.73	7.81	7.88	7.95	.01		
5.61	5.71	5.80	5.88	5.95	6.02	6.09	6.15	6.21	.05	12	
7.06	7.17	7.26	7.36	7.44	7.52	7.59	7.66	7.73	.01		
5.53	5.63	5.71	5.79	5.86	5.93	5.99	6.05	6.11	.05	13	
6.90	7.01	7.10	7.19	7.27	7.35	7.42	7.48	7.55	.01		
5.46	5.55	5.64	5.71	5.79	5.85	5.91	5.97	6.03	.05	14	
6.77	6.87	6.96	7.05	7.13	7.20	7.27	7.33	7.39	.01		
5.40	5.49	5.57	5.65	5.72	5.78	5.85	5.90	5.96	.05	15	
6.66	6.76	6.84	6.93	7.00	7.07	7.14	7.20	7.26	.01		
5.35	5.44	5.52	5.59	5.66	5.73	5.79	5.84	5.90	.05	16	
6.56	6.66	6.74	6.82	6.90	6.97	7.03	7.09	7.15	.01		
5.31	5.39	5.47	5.54	5.61	5.67	5.73	5.79	5.84	.05	17	
6.48	6.57	6.66	6.73	6.81	6.87	6.94	7.00	7.05	.01		
5.27	5.35	5.43	5.50	5.57	5.63	5.69	5.74	5.79	.05	18	
6.41	6.50	6.58	6.65	6.73	6.79	6.85	6.91	6.97	.01		
5.23	5.31	5.39	5.46	5.53	5.59	5.65	5.70	5.75	.05	19	
6.34	6.43	6.51	6.58	6.65	6.72	6.78	6.84	6.89	.01		
5.20	5.28	5.36	5.43	5.49	5.55	5.61	5.66	5.71	.05	20	
6.28	6.37	6.45	6.52	6.59	6.65	6.71	6.77	6.82	.01		
5.10	5.18	5.25	5.32	5.38	5.44	5.49	5.55	5.59	.05	24	
6.11	6.19	6.26	6.33	6.39	6.45	6.51	6.56	6.61	.01		
5.00	5.08	5.15	5.21	5.27	5.33	5.38	5.43	5.47	.05	30	
5.93	6.01	6.08	6.14	6.20	6.26	6.31	6.36	6.41	.01		
4.90	4.98	5.04	5.11	5.16	5.22	5.27	5.31	5.36	.05	40	
5.76	5.83	5.90	5.96	6.02	6.07	6.12	6.16	6.21	.01		
4.81	4.88	4.94	5.00	5.06	5.11	5.15	5.20	5.24	.05	60	
5.60	5.67	5.73	5.78	5.84	5.89	5.93	5.97	6.01	.01		
4.71	4.78	4.84	4.90	4.95	5.00	5.04	5.09	5.13	.05	120	
5.44	5.50	5.56	5.61	5.66	5.71	5.75	5.79	5.83	.01		
4.62	4.68	4.74	4.80	4.85	4.89	4.93	4.97	5.01	.05	∞	
5.29	5.35	5.40	5.45	5.49	5.54	5.57	5.61	5.65	.01		

SOURCE: Abridged from Table 29 in E. S. Pearson and H. O. Hartley, eds., *Biometrika Tables for Statisticians*, 3rd ed., 1966, Vol. 1, pp. 176–177. Reprinted by permission of the Biometrika Trustees.