

Table A.17* Critical Values for the Signed-Rank Test

<i>n</i>	One-Sided $\alpha = 0.01$	One-Sided $\alpha = 0.025$	One-Sided $\alpha = 0.05$
	Two-Sided $\alpha = 0.02$	Two-Sided $\alpha = 0.05$	Two-Sided $\alpha = 0.1$
5			1
6		1	2
7	0	2	4
8	2	4	6
9	3	6	8
10	5	8	11
11	7	11	14
12	10	14	17
13	13	17	21
14	16	21	26
15	20	25	30
16	24	30	36
17	28	35	41
18	33	40	47
19	38	46	54
20	43	52	60
21	49	59	68
22	56	66	75
23	62	73	83
24	69	81	92
25	77	90	101
26	85	98	110
27	93	107	120
28	102	117	130
29	111	127	141
30	120	137	152

*Reproduced from F. Wilcoxon and R. A. Wilcox, *Some Rapid Approximate Statistical Procedures*, American Cyanamid Company, Pearl River, N.Y., 1964, by permission of the American Cyanamid Company.

Table A.18* Critical Values for the Wilcoxon Rank-Sum Test

		One-Tailed Test at $\alpha = 0.001$ or Two-Tailed Test at $\alpha = 0.002$														
		n_2														
n_1		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1																
2																
3													0	0	0	0
4						0	0	0	1	1	1	2	2	3	3	3
5			0	0	1	1	2	2	3	3	4	5	5	6	7	7
6	0		1	2	2	3	4	4	5	6	7	8	9	10	11	12
7			2	3	3	5	6	7	8	9	10	11	13	14	15	16
8				5	5	6	8	9	11	12	14	15	17	18	20	21
9					7	8	10	12	14	15	17	19	21	23	25	26
10						10	12	14	17	19	21	23	25	27	29	32
11							15	17	20	22	24	27	29	32	34	37
12								20	23	25	28	31	34	37	40	42
13									26	29	32	35	38	42	45	48
14										32	36	39	43	46	50	54
15											40	43	47	51	55	59
16												48	52	56	60	65
17													57	61	66	70
18														66	71	76
19															77	82
20																88

One-Tailed Test at $\alpha = 0.01$ or Two-Tailed Test at $\alpha = 0.02$

		One-Tailed Test at $\alpha = 0.01$ or Two-Tailed Test at $\alpha = 0.02$															
		n_2															
n_1		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1																	
2										0	0	0	0	0	0	1	1
3				0	0	1	1	1	2	2	2	3	3	4	4	4	5
4	0		1	1	2	3	3	4	5	5	6	7	7	8	9	9	10
5		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
6			3	4	6	7	8	9	11	12	13	15	16	18	19	20	22
7				6	8	9	11	12	14	16	17	19	21	23	24	26	28
8					10	11	13	15	17	20	22	24	26	28	30	32	34
9						14	16	18	21	23	26	28	31	33	36	38	40
10							19	22	24	27	30	33	36	38	41	44	47
11								25	28	31	34	37	41	44	47	50	53
12									31	35	38	42	46	49	53	56	60
13										39	43	47	51	55	59	63	67
14											47	51	56	60	65	69	73
15												56	61	66	70	75	80
16													66	71	76	82	87
17														77	82	88	93
18															88	94	100
19																101	107
20																	114

*Based in part on Tables 1, 3, 5, and 7 of D. Auble, "Extended Tables for the Mann-Whitney Statistic," *Bulletin of the Institute of Educational Research at Indiana University*, 1, No. 2, 1953, by permission of the director.

Table A.18 (continued) Critical Values for the Wilcoxon Rank-Sum Test

One-Tailed Test at $\alpha = 0.025$ or Two-Tailed Test at $\alpha = 0.05$

20	n_1	n_2																	
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
	1																		
	2																		
0	3		0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	
3	4	0	1	2	3	4	4	5	6	7	8	9	10	11	12	13	13		
7	5		2	3	5	6	7	8	9	11	12	13	14	15	17	18	19	20	
12	6			5	6	8	10	11	13	14	16	17	19	21	22	24	25	27	
16	7				8	10	12	14	16	18	20	22	24	26	28	30	32	34	
21	8					13	15	17	19	22	24	26	29	31	34	36	38	41	
26	9						17	20	23	26	28	31	34	37	39	42	45	48	
32	10							23	26	29	33	36	39	42	45	48	52	55	
37	11								30	33	37	40	44	47	51	55	58	62	
42	12									37	41	45	49	53	57	61	65	69	
48	13										45	50	54	59	63	67	72	76	
54	14											55	59	64	67	74	78	83	
59	15												64	70	75	80	85	90	
65	16													75	81	86	92	98	
70	17														87	93	99	105	
76	18															99	106	112	
82	19																113	119	
88	20																	127	

One-Tailed Test at $\alpha = 0.05$ or Two-Tailed Test at $\alpha = 0.1$

20	n_1	n_2																	
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	1																	0	0
	2																	4	4
1	3		0	0	0	1	1	1	1	2	2	3	3	3	3	4	4	10	11
5	4	0	0	1	2	2	3	4	4	5	5	6	7	7	8	9	9	17	18
10	5		1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	23	25
16	6			4	5	6	8	9	11	12	13	15	16	18	19	20	22	30	32
22	7				7	8	10	12	14	16	17	19	21	23	25	26	28	37	39
28	8					11	13	15	17	19	21	24	26	28	30	33	35	44	47
34	9						15	18	20	23	26	28	31	33	36	39	41	51	54
40	10							21	24	27	30	33	36	39	42	45	48	58	62
47	11								27	31	34	37	41	44	48	51	55	65	69
53	12									34	38	42	46	50	54	57	61	72	77
60	13										42	47	51	55	60	64	68	80	84
67	14											51	56	61	65	70	75	87	92
73	15												61	66	71	77	82	94	100
80	16													72	77	83	88	101	107
87	17														83	89	95	109	115
93	18															96	102	116	123
100	19																109	123	130
107	20																	123	138
114																			

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