

TESTS OF SIGNIFICANCE IN A 2×2 CONTINGENCY TABLE:
EXTENSION OF FINNEY'S TABLE

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EDITORIAL FOREWORD

Finney (1948) has given a table which may be used to test the significance of the deviation from proportionality in any 2×2 contingency table having both the frequencies in one of its margins less than or equal to 15. The table printed below extends the range of Finney's table up to marginal frequencies of 20. As the interpretation and uses of the new table are exactly similar to those of the 1948 table, only a brief introductory statement is required.*

Using Finney's notation, the contingency table should be arranged in the form

	Number of		Total
	Successes	Failures	
Series I Series II	a b	$A - a$ $B - b$	A B
	$r = a + b$	$A + B - a - b$	$A + B$

where series I is defined to be that which makes $A \geq B$, and the type of observation conventionally regarded as a 'success' is that which makes $a/A \geq b/B$. The table of significance levels is arranged in sections according to the value of A ; the sections for $A = 9(1)15$ were given by Finney, while those for $A = 16(1)20$ computed by Latscha are printed below.

For given data, the table is entered in the section for A , the subsection for B and the line for a ; then the main body of the table shows in bold type the appropriate significance points for b . Thus if the observed value of b is equal to or less than the bold integer in the column headed 0.05, 0.025, 0.01 or 0.005, then a/A is significantly greater than b/B (single-tail test) at these probability levels. On the other hand, for the two-tail test, if b is equal to or less than the integer in a given column, a/A is significantly *different from* b/B at a probability level equal to *twice* the figure heading that column, i.e. at the 0.10, 0.05, 0.02 and 0.01 levels, respectively. A dash, or absence of an entry, for some combination of A , B and a indicates that no 2×2 table in that class can show a significant effect at that level.

Owing to the discontinuous character of the hypergeometric distribution, the conditional probability that, for a given value of $a + b$, b will be equal to or less than the value specified in bold type will generally be less, and often very considerably less, than that shown at the head of the column; the true probabilities are given in small type.

* Copies of Finney's table are available as a *Biometrika* 'separate' and the present extension will be made available in similar form. Finney's table, but not the extension, is included in the new *Biometrika Tables for Statisticians* now at Press.

As an illustration, we may use Lange's data on criminality among twin brothers or sisters of criminals (Fisher, 1946, §21.01). This example was taken by Finney (1948), but as $A > 15$ he used it to show how his table could be extended under certain conditions. As $A \leq 20$, direct entry is now possible in Latscha's table.

The contingency table shows the number of twin brother or sisters of criminals who had also been convicted of crime, classing separately monozygotic and dizygotic (but like-sexed) twins:

	Not convicted	Convicted	Total
Dizygotic	15 (= a)	2	17 (= A)
Monozygotic	3 (= b)	10	13 (= B)
Total	18	12	30

Following the rule given above, the letters A , B , a and b are associated with the observed frequencies as shown. The null-hypothesis is that the twin of a criminal is no more likely to be convicted of crime if the twinning is monozygotic than if it is dizygotic. If the only deviation from the hypothesis which we are prepared to consider is that monozygotic twins behave more similarly than dizygotic, a single-tail test will be appropriate and we shall ask whether $a/A = 15/17$ is significantly greater than $b/B = 3/13$.

Turning to the appropriate section of the table with $A = 17$, $B = 13$ and $a = 15$ we find that the observed value of $b = 3$ is significant at the 0.5 % level, since it is less than 4, the last entry in the row of bold figures.

The figure in small type following $b = 4$ indicates that for a contingency table with marginal frequencies

$$A = 17, \quad B = 13, \quad r = a + b = 15 + 4 = 19, \quad A + B - a - b = 11,$$

the conditional probability of an arrangement within the table with $b \leq 4$ is 0.002 on the null hypothesis of independence. The probability that $b \leq 3$ within the observed table (having $a + b = 18$) is not recorded, but is < 0.002 .

As far as possible, checks on the internal consistency of the table have been made as well as comparisons with the more extensive tables for the special case $A = B$ published by Swaroop (1950).

REFERENCES

- FINNEY, D. J. (1948). *Biometrika*, **35**, 148.
 FISHER, R. A. (1946). *Statistical Methods for Research Workers*, 10th ed. Edinburgh: Oliver and Boyd.
 SWAROOP, S. (1950). *Indian Med. Res. Mem.*, no. 35.

Significance tests in a 2 x 2 contingency table

	a	Probability					a	Probability			
		0.05	0.025	0.01	0.005			0.05	0.025	0.01	0.005
A=16 B=16	16	11 .022	11 .022	10 .009	9 .003	A=16 B=12	16	8 .024	8 .024	7 .008	6 .002
	15	10 .041	9 .019	8 .008	7 .003		15	7 .036	6 .013	5 .004	5 .004
	14	8 .027	7 .012	6 .005 ⁻	6 .005 ⁻		14	6 .040	5 .015 ⁻	4 .005 ⁻	4 .005 ⁻
	13	7 .033	6 .015 ⁻	5 .006	4 .002		13	5 .039	4 .014	3 .004	3 .004
	12	6 .037	5 .016	4 .006	3 .002		12	4 .034	3 .012	2 .003	2 .003
	11	5 .038	4 .016	3 .006	2 .002		11	3 .027	2 .008	2 .008	1 .002
	10	4 .037	3 .015 ⁻	2 .005 ⁻	2 .005 ⁻		10	2 .019	2 .019	1 .005 ⁻	1 .005 ⁻
	9	3 .033	2 .012	1 .003	1 .003		9	2 .040	1 .011	0 .002	0 .002
	8	2 .027	1 .008	1 .008	0 .001		8	1 .024	1 .024	0 .004	0 .004
	7	1 .019	1 .019	0 .003	0 .003		7	1 .048	0 .010 ⁻	0 .010 ⁻	—
6	1 .041	0 .009	0 .009	—	6	0 .021	0 .021	—	—		
5	0 .022	0 .022	—	—	5	0 .044	—	—	—		
15	16	11 .043	10 .018	9 .007	8 .002	11	16	7 .019	7 .019	6 .006	5 .002
	15	9 .033	8 .014	7 .005 ⁺	6 .002		15	6 .027	5 .009	5 .009	4 .002
	14	8 .044	7 .019	6 .008	5 .003		14	5 .027	4 .009	4 .009	3 .002
	13	6 .023	6 .023	5 .009	4 .003		13	4 .024	4 .024	3 .008	2 .002
	12	5 .024	5 .024	4 .009	3 .003		12	3 .019	3 .019	2 .005 ⁺	1 .001
	11	4 .023	4 .023	3 .008	2 .002		11	3 .041	2 .013	1 .003	1 .003
	10	4 .049	3 .020	2 .006	1 .001		10	2 .028	1 .007	1 .007	0 .001
	9	3 .043	2 .016	1 .004	1 .004		9	1 .016	1 .016	0 .002	0 .002
	8	2 .035 ⁻	1 .010 ⁺	0 .002	0 .002		8	1 .033	0 .006	0 .006	—
	7	1 .023	1 .023	0 .004	0 .004		7	0 .013	0 .013	—	—
6	0 .011	0 .011	—	—	6	0 .027	—	—	—		
5	0 .026	—	—	—							
14	16	10 .037	9 .014	8 .005 ⁺	7 .002	10	16	7 .046	6 .014	5 .004	5 .004
	15	8 .025 ⁺	7 .010 ⁻	7 .010 ⁻	6 .003		15	5 .018	5 .018	4 .005 ⁺	3 .001
	14	7 .032	6 .013	5 .005 ⁻	5 .005 ⁻		14	4 .018	4 .018	3 .005 ⁻	3 .005 ⁻
	13	6 .035 ⁺	5 .014	4 .005 ⁺	3 .001		13	4 .042	3 .014	2 .003	2 .003
	12	5 .035 ⁺	4 .014	3 .005 ⁻	3 .005 ⁻		12	3 .032	2 .009	2 .009	1 .002
	11	4 .033	3 .012	2 .004	2 .004		11	2 .021	2 .021	1 .005 ⁻	1 .005 ⁻
	10	3 .028	2 .009	2 .009	1 .002		10	2 .042	1 .011	0 .002	0 .002
	9	2 .021	2 .021	1 .006	0 .001		9	1 .023	1 .023	0 .004	0 .004
	8	2 .045 ⁻	1 .013	0 .002	0 .002		8	1 .045 ⁻	0 .008	0 .008	—
	7	1 .030	0 .006	0 .006	—		7	0 .017	0 .017	—	—
6	0 .013	0 .013	—	—	6	0 .035 ⁻	—	—	—		
5	0 .031	—	—	—							
13	16	9 .030	8 .011	7 .004	7 .004	9	16	6 .037	5 .010 ⁻	5 .010 ⁻	4 .002
	15	8 .047	7 .019	6 .007	5 .002		15	5 .040	4 .012	3 .003	3 .003
	14	6 .023	6 .023	5 .008	4 .003		14	4 .034	3 .010 ⁻	3 .010 ⁻	2 .002
	13	5 .023	5 .023	4 .008	3 .003		13	3 .025 ⁺	2 .007	2 .007	1 .001
	12	4 .022	4 .022	3 .007	2 .002		12	2 .016	2 .016	1 .003	1 .003
	11	4 .048	3 .018	2 .005 ⁺	1 .001		11	2 .033	1 .008	1 .008	0 .001
	10	3 .039	2 .013	1 .003	1 .003		10	1 .017	1 .017	0 .002	0 .002
	9	2 .029	1 .008	1 .008	0 .001		9	1 .034	0 .006	0 .006	—
	8	1 .018	1 .018	0 .003	0 .003		8	0 .012	0 .012	—	—
	7	1 .038	0 .007	0 .007	—		7	0 .024	0 .024	—	—
6	0 .017	0 .017	—	—	6	0 .045 ⁺	—	—	—		
5	0 .037	—	—	—							

The table shows:

(1) In bold type, for given A, B and a, the value of b (< a) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given A, B and r = a + b, the exact probability (if there is independence) that b is equal to or less than the integer shown in bold type.

Significance tests in a 2 x 2 contingency table (continued)

	a	Probability					a	Probability				
		0-05	0-025	0-01	0-005			0-05	0-025	0-01	0-005	
A=16 B=8	16	5 -028	4 -007	4 -007	3 -001	A=16 B=3	16	1 -018	1 -018	0 -001	0 -001	
	15	4 -028	3 -007	3 -007	2 -001		15	0 -004	0 -004	0 -004	0 -004	
	14	3 -021	3 -021	2 -005-	2 -005-		14	0 -010+	0 -010+	—	—	
	13	3 -047	2 -013	1 -002	1 -002		13	0 -021	0 -021	—	—	
	12	2 -028	1 -006	1 -006	0 -001		12	0 -036	—	—	—	
	11	1 -014	1 -014	0 -002	0 -002		2	16	0 -007	0 -007	0 -007	—
	10	1 -027	0 -004	0 -004	0 -004			15	0 -020	0 -020	—	—
	9	0 -009	0 -009	0 -009	—			14	0 -039	—	—	—
	8	0 -017	0 -017	—	—							
	7	0 -033	—	—	—							
7	16	4 -020	4 -020	3 -004	3 -004	A=17 B=17	17	12 -022	12 -022	11 -009	10 -004	
	15	3 -017	3 -017	2 -003	2 -003		16	11 -043	10 -020	9 -008	8 -003	
	14	3 -045+	2 -011	1 -002	1 -002		15	9 -029	8 -013	7 -005+	6 -002	
	13	2 -026	1 -005-	1 -005-	1 -005-		14	8 -035+	7 -016	6 -007	5 -002	
	12	1 -012	1 -012	0 -001	0 -001		13	7 -040	6 -018	5 -007	4 -003	
	11	1 -024	1 -024	0 -003	0 -003		12	6 -042	5 -019	4 -007	3 -002	
	10	1 -045-	0 -007	0 -007	—		11	5 -042	4 -018	3 -007	2 -002	
	9	0 -014	0 -014	—	—		10	4 -040	3 -016	2 -005+	1 -001	
	8	0 -026	—	—	—		9	3 -035+	2 -013	1 -003	1 -003	
	7	0 -047	—	—	—		8	2 -029	1 -008	1 -008	0 -001	
6	16	3 -013	3 -013	2 -002	2 -002	16	7	1 -020	1 -020	0 -004	0 -004	
	15	3 -046	2 -009	2 -009	1 -001		6	1 -043	0 -009	0 -009	—	
	14	2 -025+	1 -004	1 -004	1 -004		5	0 -022	0 -022	—	—	
	13	1 -011	1 -011	0 -001	0 -001		17	12 -044	11 -018	10 -007	9 -003	
	12	1 -023	1 -023	0 -003	0 -003		16	10 -035-	9 -015-	8 -006	7 -002	
	11	1 -043	0 -006	0 -006	—		15	9 -046	8 -021	7 -009	6 -003	
	10	0 -012	0 -012	—	—		14	7 -025+	6 -011	5 -004	5 -004	
	9	0 -023	0 -023	—	—		13	6 -027	5 -011	4 -004	4 -004	
	8	0 -040	—	—	—		12	5 -027	4 -011	3 -004	3 -004	
	5	16	3 -048	2 -008	2 -008		1 -001	11	4 -025+	3 -009	3 -009	2 -003
15		2 -028	1 -004	1 -004	1 -004	10	3 -022	3 -022	2 -007	1 -002		
14		1 -011	1 -011	0 -001	0 -001	9	3 -046	2 -017	1 -004	1 -004		
13		1 -025+	0 -003	0 -003	0 -003	8	2 -036	1 -011	0 -002	0 -002		
12		1 -047	0 -006	0 -006	—	7	1 -024	1 -024	0 -005-	0 -005-		
11		0 -012	0 -012	—	—	6	0 -011	0 -011	—	—		
10		0 -023	0 -023	—	—	5	0 -026	—	—	—		
9		0 -039	—	—	—	15	17	11 -038	10 -015-	9 -006	8 -002	
4		16	2 -032	1 -004	1 -004		1 -004	16	9 -027	8 -011	7 -004	7 -004
		15	1 -013	1 -013	0 -001		1 -001	15	8 -035+	7 -015-	6 -006	5 -002
	14	1 -032	0 -003	0 -003	0 -003		14	7 -040	6 -017	5 -006	4 -002	
	13	0 -007	0 -007	0 -007	—		13	6 -041	5 -017	4 -006	3 -002	
	12	0 -014	0 -014	—	—		12	5 -039	4 -016	3 -005+	2 -001	
	11	0 -026	—	—	—		11	4 -035+	3 -013	2 -004	2 -004	
	10	0 -043	—	—	—		10	3 -029	2 -010-	2 -010-	1 -002	
							9	2 -022	2 -022	1 -006	0 -001	
							8	2 -046	1 -014	0 -002	0 -002	
						7	1 -030	0 -006	0 -006	—		
					6	0 -014	0 -014	—	—			
					5	0 -031	—	—	—			

Significance tests in a 2 x 2 contingency table (continued)

	<i>a</i>	Probability					<i>a</i>	Probability				
		0-05	0-025	0-01	0-005			0-05	0-025	0-01	0-005	
A=17 B=14	17	10 .032	9 .012	8 .004	8 .004	A=17 B=11	13	4 .042	3 .014	2 .004	2 .004	
	16	8 .021	8 .021	7 .008	6 .003		12	3 .031	2 .009	2 .009	1 .002	
	15	7 .026	6 .010 ⁻	6 .010 ⁻	5 .003		11	2 .020	2 .020	1 .005 ⁻	1 .005 ⁻	
	14	6 .028	5 .011	4 .004	4 .004		10	2 .040	1 .011	0 .001	0 .001	
	13	5 .027	4 .010 ⁻	4 .010 ⁻	3 .003		9	1 .022	1 .022	0 .004	0 .004	
	12	4 .024	4 .024	3 .008	2 .002		8	1 .042	0 .008	0 .008	—	
	11	4 .049	3 .019	2 .006	1 .001		7	0 .016	0 .016	—	—	
	10	3 .040	2 .014	1 .003	1 .003		6	0 .033	—	—	—	
	9	2 .029	1 .008	1 .008	0 .001		10	17	7 .041	6 .012	5 .003	5 .003
	8	1 .018	1 .018	0 .003	0 .003			16	6 .047	5 .015 ⁺	4 .004	4 .004
	7	1 .038	0 .007	0 .007	—			15	5 .043	4 .014	3 .004	3 .004
	6	0 .017	0 .017	—	—			14	4 .034	3 .010 ⁺	2 .002	2 .002
	5	0 .036	—	—	—			13	3 .024	3 .024	2 .007	1 .001
	13	17	9 .026	8 .009	8 .009			7 .003	12	3 .049	2 .015 ⁺	1 .003
16		8 .040	7 .015 ⁺	6 .005 ⁺	5 .002	11		2 .031	1 .007	1 .007	0 .001	
15		7 .045 ⁺	6 .018	5 .006	4 .002	10		1 .016	1 .016	0 .002	0 .002	
14		6 .045 ⁺	5 .018	4 .006	3 .002	9		1 .031	0 .005 ⁺	0 .005 ⁺	—	
13		5 .042	4 .016	3 .005 ⁺	2 .001	8		0 .011	0 .011	—	—	
12		4 .035 ⁺	3 .013	2 .004	2 .004	7		0 .022	0 .022	—	—	
11		3 .028	2 .009	2 .009	1 .002	6		0 .042	—	—	—	
10		2 .019	2 .019	1 .005 ⁻	1 .005 ⁻	9		17	6 .032	5 .008	5 .008	4 .002
9		2 .040	1 .011	0 .002	0 .002			16	5 .034	4 .010 ⁻	4 .010 ⁻	3 .002
8		1 .024	1 .024	0 .004	0 .004		15	4 .028	3 .008	3 .008	2 .002	
7		1 .047	0 .010 ⁻	0 .010 ⁻	—		14	3 .020	3 .020	2 .005 ⁻	2 .005 ⁻	
6		0 .021	0 .021	—	—		13	3 .042	2 .012	1 .002	1 .002	
5		0 .043	—	—	—		12	2 .025 ⁺	1 .006	1 .006	0 .001	
12		17	8 .021	8 .021	7 .007		6 .002	11	2 .048	1 .012	0 .002	0 .002
	16	7 .030	6 .011	5 .003	5 .003		10	1 .024	1 .024	0 .004	0 .004	
	15	6 .033	5 .012	4 .004	4 .004		9	1 .045 ⁻	0 .008	0 .008	—	
	14	5 .030	4 .011	3 .003	3 .003		8	0 .016	0 .016	—	—	
	13	4 .026	3 .008	3 .008	2 .002		7	0 .030	—	—	—	
	12	3 .020	3 .020	2 .006	1 .001		8	17	5 .024	5 .024	4 .006	3 .001
	11	3 .041	2 .013	1 .003	1 .003			16	4 .023	4 .023	3 .006	2 .001
	10	2 .028	1 .007	1 .007	0 .001			15	3 .017	3 .017	2 .004	2 .004
	9	1 .016	1 .016	0 .002	0 .002	14		3 .039	2 .010 ⁻	2 .010 ⁻	1 .002	
	8	1 .032	0 .006	0 .006	—	13		2 .022	2 .022	1 .004	1 .004	
	7	0 .012	0 .012	—	—	12		2 .043	1 .010 ⁻	1 .010 ⁻	0 .001	
	6	0 .026	—	—	—	11		1 .020	1 .020	0 .003	0 .003	
	11	17	7 .016	7 .016	6 .005 ⁻	6 .005 ⁻		10	1 .038	0 .006	0 .006	—
		16	6 .022	6 .022	5 .007	4 .002		9	0 .012	0 .012	—	—
15		5 .022	5 .022	4 .007	3 .002	8		0 .022	0 .022	—	—	
14		4 .019	4 .019	3 .006	2 .001	7		0 .040	—	—	—	

The table shows:

- (1) In bold type, for given *A*, *B* and *a*, the value of *b* (<*a*) which is just significant at the probability level quoted (single-tail test).
- (2) In small type, for given *A*, *B* and $r = a + b$, the exact probability (if there is independence) that *b* is equal to or less than the integer shown in bold type.

Significance tests in a 2 x 2 contingency table (continued)

	a	Probability					a	Probability				
		0-05	0-025	0-01	0-005			0-05	0-025	0-01	0-005	
A=17 B=7	17	4 .017	4 .017	3 .003	3 .003	A=18 B=18	18	13 .023	13 .023	12 .010 ⁻	11 .004	
	16	3 .014	3 .014	2 .003	2 .003		17	12 .044	11 .020	10 .009	9 .004	
	15	3 .038	2 .009	2 .009	1 .001		16	10 .030	9 .014	8 .006	7 .002	
	14	2 .021	2 .021	1 .004	1 .004		15	9 .038	8 .018	7 .008	6 .003	
	13	2 .042	1 .009	1 .009	0 .001		14	8 .043	7 .020	6 .009	5 .003	
	12	1 .018	1 .018	0 .002	0 .002		13	7 .046	6 .022	5 .009	4 .003	
	11	1 .034	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻		12	6 .047	5 .022	4 .009	3 .003	
	10	0 .010 ⁻	0 .010 ⁻	0 .010 ⁻	—		11	5 .046	4 .020	3 .008	2 .002	
9	0 .019	0 .019	—	—	10	4 .043	3 .018	2 .006	1 .001			
8	0 .033	—	—	—	9	3 .038	2 .014	1 .004	1 .004			
6	17	3 .011	3 .011	2 .002	2 .002	8	2 .030	1 .009	1 .009	0 .001		
	16	3 .040	2 .008	2 .008	1 .001	7	1 .020	1 .020	0 .004	0 .004		
	15	2 .021	2 .021	1 .003	1 .003	6	1 .044	0 .010 ⁻	0 .010 ⁻	—		
	14	2 .045 ⁺	1 .009	1 .009	0 .001	5	0 .023	0 .023	—	—		
	13	1 .018	1 .018	0 .002	0 .002	17	18	13 .045 ⁺	12 .019	11 .008	10 .003	
	12	1 .035 ⁻	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻		17	11 .036	10 .016	9 .007	8 .002	
	11	0 .009	0 .009	0 .009	—		16	10 .049	9 .023	8 .010 ⁻	7 .004	
	10	0 .017	0 .017	—	—		15	8 .028	7 .012	6 .005 ⁻	6 .005 ⁻	
9	0 .030	—	—	—	14		7 .030	6 .013	5 .005 ⁺	4 .002		
8	0 .050 ⁻	—	—	—	13		6 .031	5 .013	4 .005 ⁻	4 .005 ⁻		
5	17	3 .043	2 .006	2 .006	1 .001		12	5 .030	4 .012	3 .004	3 .004	
	16	2 .024	2 .024	1 .003	1 .003		11	4 .028	3 .010 ⁺	2 .003	2 .003	
	15	1 .009	1 .009	1 .009	0 .001	10	3 .023	3 .023	2 .008	1 .002		
	14	1 .021	1 .021	0 .002	0 .002	9	3 .047	2 .018	1 .005 ⁻	1 .005 ⁻		
	13	1 .039	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻	8	2 .037	1 .011	0 .002	0 .002		
	12	0 .010 ⁻	0 .010 ⁻	0 .010 ⁻	—	7	1 .025 ⁻	1 .025 ⁻	0 .005 ⁻	0 .005 ⁻		
	11	0 .018	0 .018	—	—	6	0 .011	0 .011	—	—		
	10	0 .030	—	—	—	5	0 .026	—	—	—		
9	0 .049	—	—	—	16	18	12 .039	11 .016	10 .006	9 .002		
4	17	2 .029	1 .003	1 .003		1 .003	17	10 .029	9 .012	8 .005 ⁻	8 .005 ⁻	
	16	1 .011	1 .011	0 .001		0 .001	16	9 .038	8 .017	7 .007	6 .002	
	15	1 .028	0 .003	0 .003		0 .003	15	8 .043	7 .019	6 .008	5 .003	
	14	0 .006	0 .006	0 .006		—	14	7 .046	6 .020	5 .008	4 .003	
	13	0 .012	0 .012	—		—	13	6 .045 ⁺	5 .020	4 .007	3 .002	
	12	0 .021	0 .021	—		—	12	5 .042	4 .018	3 .006	2 .002	
	11	0 .035 ⁺	—	—		—	11	4 .037	3 .015 ⁻	2 .004	2 .004	
	3	17	1 .016	1 .016	0 .001	0 .001	10	3 .031	2 .011	1 .003	1 .003	
16		1 .046	0 .004	0 .004	0 .004	9	2 .023	2 .023	1 .006	0 .001		
15		0 .009	0 .009	0 .009	—	8	2 .046	1 .014	0 .002	0 .002		
14		0 .018	0 .018	—	—	7	1 .030	0 .006	0 .006	—		
13		0 .031	—	—	—	6	0 .014	0 .014	—	—		
12		0 .049	—	—	—	5	0 .031	—	—	—		
2		17	0 .006	0 .006	0 .006	—	15	18	11 .033	10 .013	9 .005 ⁻	9 .005 ⁻
		16	0 .018	0 .018	—	—		17	9 .023	9 .023	8 .009	7 .003
	15	0 .035 ⁺	—	—	—	16		8 .029	7 .012	6 .004	6 .004	
						15		7 .031	6 .013	5 .005 ⁻	5 .005 ⁻	
						14		6 .031	5 .013	4 .004	4 .004	
					13	5 .029	4 .011	3 .004	3 .004			

Significance tests in a 2 x 2 contingency table (continued)

	<i>a</i>	Probability					<i>a</i>	Probability					
		0-05	0-025	0-01	0-005			0-05	0-025	0-01	0-005		
A=18 B=15	12	4 .025 ⁺	3 .009	3 .009	2 .003	A=18 B=12	10	2 .038	1 .010 ⁺	0 .001	0 .001		
	11	3 .020	3 .020	2 .006	1 .001		9	1 .021	1 .021	0 .003	0 .003		
	10	3 .041	2 .014	1 .004	1 .004		8	1 .040	0 .007	0 .007	—		
	9	2 .030	1 .008	1 .008	0 .001		7	0 .016	0 .016	—	—		
	8	1 .018	1 .018	0 .003	0 .003		6	0 .031	—	—	—		
	7	1 .038	0 .007	0 .007	—		11	18	8 .045 ⁺	7 .014	6 .004	6 .004	
	6	0 .017	0 .017	—	—			17	6 .018	6 .018	5 .006	4 .001	
	5	0 .036	—	—	—			16	5 .018	5 .018	4 .005 ⁺	3 .001	
	14	18	10 .028	9 .010 ⁻	9 .010 ⁻			8 .003	15	5 .043	4 .015 ⁻	3 .004	3 .004
		17	9 .043	8 .017	7 .006			6 .002	14	4 .033	3 .011	2 .003	2 .003
16		8 .050 ⁻	7 .021	6 .008	5 .003	13		3 .023	3 .023	2 .007	1 .001		
15		6 .022	6 .022	5 .008	4 .003	12		3 .046	2 .014	1 .003	1 .003		
14		6 .049	5 .020	4 .007	3 .002	11		2 .029	1 .007	1 .007	0 .001		
13		5 .044	4 .017	3 .006	2 .001	10		1 .015 ⁻	1 .015 ⁻	0 .002	0 .002		
12		4 .037	3 .013	2 .004	2 .004	9		1 .029	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻		
11		3 .028	2 .009	2 .009	1 .002	8	0 .010 ⁺	0 .010 ⁺	—	—			
10		2 .020	2 .020	1 .005 ⁻	1 .005 ⁻	7	0 .020	0 .020	—	—			
9		2 .039	1 .011	0 .002	0 .002	6	0 .039	—	—	—			
13	8	1 .024	1 .024	0 .004	0 .004	10	18	7 .037	6 .010 ⁺	5 .003	5 .003		
	7	1 .047	0 .009	0 .009	—		17	6 .041	5 .013	4 .003	4 .003		
	6	0 .020	0 .020	—	—		16	5 .036	4 .011	3 .003	3 .003		
	5	0 .043	—	—	—		15	4 .028	3 .008	3 .008	2 .002		
	18	9 .023	9 .023	8 .008	7 .002		14	3 .019	3 .019	2 .005 ⁻	2 .005 ⁻		
	17	8 .034	7 .012	6 .004	6 .004		13	3 .039	2 .011	1 .002	1 .002		
	16	7 .037	6 .014	5 .005 ⁻	5 .005 ⁻		12	2 .023	2 .023	1 .005 ⁺	0 .001		
	15	6 .036	5 .014	4 .004	4 .004		11	2 .043	1 .011	0 .001	0 .001		
	14	5 .032	4 .012	3 .004	3 .004		10	1 .022	1 .022	0 .003	0 .003		
	13	4 .027	3 .009	3 .009	2 .002		9	1 .040	0 .007	0 .007	—		
12	12	3 .020	3 .020	2 .006	1 .001	8	0 .014	0 .014	—	—			
	11	3 .040	2 .013	1 .003	1 .003	7	0 .027	—	—	—			
	10	2 .027	1 .007	1 .007	0 .001	6	0 .049	—	—	—			
	9	1 .015 ⁺	1 .015 ⁺	0 .002	0 .002	9	18	6 .029	5 .007	5 .007	4 .002		
	8	1 .031	0 .006	0 .006	—		17	5 .030	4 .008	4 .008	3 .002		
	7	0 .012	0 .012	—	—		16	4 .023	4 .023	3 .006	2 .001		
	6	0 .025 ⁺	—	—	—		15	3 .016	3 .016	2 .004	2 .004		
	18	8 .018	8 .018	7 .006	6 .002		14	3 .034	2 .009	2 .009	1 .002		
	17	7 .026	6 .009	6 .009	5 .003		13	2 .019	2 .019	1 .004	1 .004		
	16	6 .027	5 .009	5 .009	4 .003		12	2 .037	1 .009	1 .009	0 .001		
15	5 .024	5 .024	4 .008	3 .002	11		1 .018	1 .018	0 .002	0 .002			
14	4 .020	4 .020	3 .006	2 .001	10		1 .033	0 .005 ⁺	0 .005 ⁺	—			
13	4 .042	3 .014	2 .004	2 .004	9		0 .010 ⁺	0 .010 ⁺	—	—			
12	3 .030	2 .009	2 .009	1 .002	8	0 .020	0 .020	—	—				
11	2 .019	2 .019	1 .005 ⁻	1 .005 ⁻	7	0 .036	—	—	—				

The table shows:

(1) In bold type, for given *A*, *B* and *a*, the value of *b* (<*a*) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given *A*, *B* and $r = a + b$, the exact probability (if there is independence) that *b* is equal to or less than the integer shown in bold type.

Significance tests in a 2 x 2 contingency table (continued)

	a	Probability					a	Probability				
		0.05	0.025	0.01	0.005			0.05	0.025	0.01	0.005	
A=18 B=8	18	5 .022	5 .022	4 .005 ⁻	4 .005 ⁻	A=18 B=4	13	0 .017	0 .017	—	—	
	17	4 .020	4 .020	3 .004	3 .004		12	0 .029	—	—	—	
	16	3 .014	3 .014	2 .003	2 .003		11	0 .045 ⁺	—	—	—	
	15	3 .032	2 .008	2 .008	1 .001		3	18	1 .014	1 .014	0 .001	0 .001
	14	2 .017	2 .017	1 .003	1 .003			17	1 .041	0 .003	0 .003	0 .003
	13	2 .034	1 .007	1 .007	0 .001			16	0 .008	0 .008	0 .008	—
	12	1 .015 ⁺	1 .015 ⁺	0 .002	0 .002			15	0 .015 ⁺	0 .015 ⁺	—	—
	11	1 .028	0 .004	0 .004	0 .004			14	0 .026	—	—	—
	10	1 .049	0 .008	0 .008	—		13	0 .042	—	—	—	
	9	0 .016	0 .016	—	—		2	18	0 .005 ⁺	0 .005 ⁺	0 .005 ⁺	—
8	0 .028	—	—	—	17	0 .016		0 .016	—	—		
7	0 .048	—	—	—	16	0 .032		—	—	—		
7	18	4 .015 ⁺	4 .015 ⁺	3 .003	3 .003	A=19 B=19	19	14 .023	14 .023	13 .010 ⁻	12 .004	
	17	3 .012	3 .012	2 .002	2 .002		18	13 .045 ⁻	12 .021	11 .009	10 .004	
	16	3 .032	2 .007	2 .007	1 .001		17	11 .031	10 .015 ⁻	9 .006	8 .003	
	15	2 .017	2 .017	1 .003	1 .003		16	10 .039	9 .019	8 .009	7 .003	
	14	2 .034	1 .007	1 .007	0 .001		15	9 .046	8 .022	6 .004	6 .004	
	13	1 .014	1 .014	0 .002	0 .002		14	8 .050 ⁻	7 .024	5 .004	5 .004	
	12	1 .027	0 .004	0 .004	0 .004		13	6 .025 ⁺	5 .011	4 .004	4 .004	
	11	1 .046	0 .007	0 .007	—		12	5 .024	5 .024	3 .003	3 .003	
	10	0 .013	0 .013	—	—		11	5 .050 ⁻	4 .022	3 .009	2 .003	
	9	0 .024	0 .024	—	—		10	4 .046	3 .019	2 .006	1 .002	
8	0 .040	—	—	—	9	3 .039	2 .015 ⁻	1 .004	1 .004			
6	18	3 .010 ⁻	3 .010 ⁻	3 .010 ⁻	2 .001	8	2 .031	1 .009	1 .009	0 .002		
	17	3 .035 ⁺	2 .006	2 .006	1 .001	7	1 .021	1 .021	0 .004	0 .004		
	16	2 .018	2 .018	1 .003	1 .003	6	1 .045 ⁻	0 .010 ⁻	0 .010 ⁻	—		
	15	2 .038	1 .007	1 .007	0 .001	5	0 .023	0 .023	—	—		
	14	1 .015 ⁻	1 .015 ⁻	0 .002	0 .002	18	19	14 .046	13 .020	12 .008	11 .003	
	13	1 .028	0 .003	0 .003	0 .003		18	12 .037	11 .017	10 .007	9 .003	
	12	1 .048	0 .007	0 .007	—		17	10 .024	10 .024	8 .004	8 .004	
	11	0 .013	0 .013	—	—		16	9 .030	8 .014	7 .006	6 .002	
	10	0 .022	0 .022	—	—		15	8 .033	7 .015 ⁺	6 .006	5 .002	
	9	0 .037	—	—	—		14	7 .035 ⁺	6 .016	5 .006	4 .002	
5	18	3 .040	2 .006	2 .006	1 .001		13	6 .035 ⁻	5 .015 ⁺	4 .006	3 .002	
	17	2 .021	2 .021	1 .003	1 .003		12	5 .033	4 .014	3 .005 ⁻	3 .005 ⁻	
	16	2 .048	1 .008	1 .008	0 .001		11	4 .030	3 .011	2 .004	2 .004	
	15	1 .017	1 .017	0 .002	0 .002		10	3 .025 ⁻	3 .025 ⁻	2 .008	1 .002	
	14	1 .033	0 .004	0 .004	0 .004	9	3 .049	2 .019	1 .005 ⁺	0 .001		
	13	0 .007	0 .007	0 .007	—	8	2 .038	1 .012	0 .002	0 .002		
	12	0 .014	0 .014	—	—	7	1 .025 ⁺	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻		
	11	0 .024	0 .024	—	—	6	0 .012	0 .012	—	—		
	10	0 .038	—	—	—	5	0 .027	—	—	—		
	4	18	2 .026	1 .003	1 .003	1 .003	17	19	13 .040	12 .016	11 .006	10 .002
17		1 .010 ⁻	1 .010 ⁻	1 .010 ⁻	0 .001	18		11 .030	10 .013	9 .005 ⁺	8 .002	
16		1 .024	1 .024	0 .002	0 .002	17		10 .040	9 .018	8 .008	7 .003	
15		1 .046	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻	16		9 .047	8 .022	7 .009	6 .003	
14		0 .010 ⁻	0 .010 ⁻	0 .010 ⁻	—							

Significance tests in a 2 x 2 contingency table (continued)

	a	Probability					a	Probability			
		0.05	0.025	0.01	0.005			0.05	0.025	0.01	0.005
A=19 B=17	15	8 .050 ⁻	7 .023	6 .010 ⁻	5 .004	A=19 B=14	16	7 .042	6 .017	5 .006	4 .002
	14	6 .023	6 .023	5 .010 ⁻	4 .003		15	6 .039	5 .015 ⁺	4 .005 ⁺	3 .001
	13	6 .049	5 .022	4 .008	3 .003		14	5 .034	4 .013	3 .004	3 .004
	12	5 .045 ⁻	4 .019	3 .007	2 .002		13	4 .027	3 .009	3 .009	2 .003
	11	4 .039	3 .015 ⁺	2 .005 ⁻	2 .005 ⁻		12	3 .020	3 .020	2 .006	1 .001
	10	3 .032	2 .011	1 .003	1 .003		11	3 .040	2 .013	1 .003	1 .003
	9	2 .024	2 .024	1 .007	0 .001		10	2 .027	1 .007	1 .007	0 .001
	8	2 .047	1 .015 ⁻	0 .002	0 .002		9	1 .015 ⁻	1 .015 ⁻	0 .002	0 .002
	7	1 .031	0 .006	0 .006	—		8	1 .030	0 .005 ⁺	0 .005 ⁺	—
	6	0 .014	0 .014	—	—		7	0 .012	0 .012	—	—
5	0 .031	—	—	—	6	0 .024	0 .024	—	—		
16	19	12 .035 ⁻	11 .013	10 .005 ⁻	10 .005 ⁻	13	5	0 .049	—	—	—
	18	10 .024	10 .024	9 .010 ⁻	8 .004		19	9 .020	9 .020	8 .006	7 .002
	17	9 .031	8 .013	7 .005 ⁺	6 .002		18	8 .029	7 .010 ⁺	6 .003	6 .003
	16	8 .035 ⁻	7 .015 ⁺	6 .006	5 .002		17	7 .031	6 .011	5 .004	5 .004
	15	7 .036	6 .015 ⁺	5 .006	4 .002		16	6 .029	5 .011	4 .003	4 .003
	14	6 .034	5 .014	4 .005 ⁺	3 .002		15	5 .025 ⁺	4 .009	4 .009	3 .003
	13	5 .031	4 .013	3 .004	3 .004		14	4 .020	4 .020	3 .006	2 .002
	12	4 .027	3 .010 ⁻	3 .010 ⁻	2 .003		13	4 .041	3 .015 ⁻	2 .004	2 .004
	11	3 .021	3 .021	2 .007	1 .002		12	3 .029	2 .009	2 .009	1 .002
	10	3 .042	2 .015 ⁻	1 .004	1 .004		11	2 .019	2 .019	1 .005 ⁻	1 .005 ⁻
15	9	2 .030	1 .009	1 .009	0 .001	10	2 .036	1 .010 ⁻	1 .010 ⁻	0 .001	
	8	1 .018	1 .018	0 .003	0 .003	9	1 .020	1 .020	0 .003	0 .003	
	7	1 .037	0 .007	0 .007	—	8	1 .038	0 .007	0 .007	—	
	6	0 .017	0 .017	—	—	7	0 .015 ⁻	0 .015 ⁻	—	—	
	5	0 .036	—	—	—	6	0 .030	—	—	—	
	19	11 .029	10 .011	9 .004	9 .004	12	19	9 .049	8 .016	7 .005 ⁻	7 .005 ⁻
	18	10 .046	9 .019	8 .007	7 .002		18	7 .022	7 .022	6 .007	5 .002
	17	8 .023	8 .023	7 .009	6 .003		17	6 .022	6 .022	5 .007	4 .002
	16	7 .025 ⁻	7 .025 ⁻	6 .010 ⁻	5 .003		16	5 .019	5 .019	4 .006	3 .002
	15	6 .024	6 .024	5 .009	4 .003		15	5 .042	4 .015 ⁺	3 .004	3 .004
14	5 .022	5 .022	4 .008	3 .002	14		4 .032	3 .011	2 .003	2 .003	
13	5 .045 ⁺	4 .018	3 .006	2 .002	13		3 .023	3 .023	2 .006	1 .001	
12	4 .037	3 .014	2 .004	2 .004	12		3 .043	2 .014	1 .003	1 .003	
11	3 .029	2 .009	2 .009	1 .002	11		2 .027	1 .007	1 .007	0 .001	
10	2 .020	2 .020	1 .005 ⁺	0 .001	10		2 .050 ⁻	1 .014	0 .002	0 .002	
14	9	2 .039	1 .011	0 .002	0 .002	9	1 .027	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻	
	8	1 .023	1 .023	0 .004	0 .004	8	1 .050 ⁻	0 .010 ⁻	0 .010 ⁻	—	
	7	1 .046	0 .009	0 .009	—	7	0 .019	0 .019	—	—	
	6	0 .020	0 .020	—	—	6	0 .037	—	—	—	
	5	0 .042	—	—	—	11	19	8 .041	7 .012	6 .003	6 .003
	19	10 .024	10 .024	9 .008	8 .003		18	7 .047	6 .016	5 .004	5 .004
	18	9 .037	8 .014	7 .005 ⁻	7 .005 ⁻		17	6 .043	5 .015 ⁻	4 .004	4 .004
	17	8 .042	7 .017	6 .006	5 .002		16	5 .035 ⁺	4 .012	3 .003	3 .003

The table shows:

(1) In bold type, for given A , B and a , the value of b ($<a$) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given A , B and $r=a+b$, the exact probability (if there is independence) that b is equal to or less than the integer shown in bold type.

Significance tests in a 2 x 2 contingency table (continued)

	a	Probability					a	Probability				
		0-05	0-025	0-01	0-005			0-05	0-025	0-01	0-005	
A=19 B=11	15	4 -027	3 -008	3 -008	2 -002	A=19 B=7	19	4 -013	4 -013	3 -002	3 -002	
	14	3 -018	3 -018	2 -005-	2 -005-		18	4 -047	3 -010+	2 -002	2 -002	
	13	3 -035+	2 -010+	1 -002	1 -002		17	3 -028	2 -006	2 -006	1 -001	
	12	2 -021	2 -021	1 -005-	1 -005-		16	2 -014	2 -014	1 -002	1 -002	
	11	2 -040	1 -010+	0 -001	0 -001		15	2 -028	1 -005+	1 -005+	0 -001	
	10	1 -020	1 -020	0 -003	0 -003		14	1 -011	1 -011	0 -001	0 -001	
	9	1 -037	0 -006	0 -006	—		13	1 -021	1 -021	0 -003	0 -003	
	8	0 -013	0 -013	—	—		12	1 -037	0 -005+	0 -005+	—	
	7	0 -025-	0 -025-	—	—		11	0 -010-	0 -010-	0 -010-	—	
	6	0 -046	—	—	—		10	0 -017	0 -017	—	—	
10	19	7 -033	6 -009	6 -009	5 -002	6	9	0 -030	—	—	—	
	18	6 -036	5 -011	4 -003	4 -003		8	0 -048	—	—	—	
	17	5 -030	4 -009	4 -009	3 -002		19	4 -050-	3 -009	3 -009	2 -001	
	16	4 -022	4 -022	3 -006	2 -001		18	3 -031	2 -005+	2 -005+	1 -001	
	15	4 -047	3 -015-	2 -004	2 -004		17	2 -015+	2 -015+	1 -002	1 -002	
	14	3 -030	2 -008	2 -008	1 -002		16	2 -032	1 -006	1 -006	0 -000	
	13	2 -017	2 -017	1 -004	1 -004		15	1 -012	1 -012	0 -001	0 -001	
	12	2 -033	1 -008	1 -008	0 -001		14	1 -023	1 -023	0 -003	0 -003	
	11	1 -016	1 -016	0 -002	0 -002		13	1 -039	0 -005+	0 -005+	—	
	10	1 -029	0 -005-	0 -005-	0 -005-		12	0 -010-	0 -010-	0 -010-	—	
9	9	0 -009	0 -009	0 -009	—	11	0 -017	0 -017	—	—		
	8	0 -018	0 -018	—	—	10	0 -028	—	—	—		
	7	0 -032	—	—	—	9	0 -045+	—	—	—		
	19	6 -026	5 -006	5 -006	4 -001	5	19	3 -036	2 -005-	2 -005-	2 -005-	
	18	5 -026	4 -007	4 -007	3 -001		18	2 -018	2 -018	1 -002	1 -002	
	17	4 -020	4 -020	3 -005-	3 -005-		17	2 -042	1 -006	1 -006	0 -000	
	16	4 -044	3 -013	2 -003	2 -003		16	1 -014	1 -014	0 -001	0 -001	
	15	3 -028	2 -007	2 -007	1 -001		15	1 -028	0 -003	0 -003	0 -003	
	14	2 -015-	2 -015-	1 -003	1 -003		14	1 -047	0 -006	0 -006	—	
	13	2 -029	1 -006	1 -006	0 -001		13	0 -011	0 -011	—	—	
12	1 -013	1 -013	0 -002	0 -002	12		0 -019	0 -019	—	—		
11	1 -024	1 -024	0 -004	0 -004	11		0 -030	—	—	—		
10	1 -042	0 -007	0 -007	—	10		0 -047	—	—	—		
8	9	0 -013	0 -013	—	—	4	19	2 -024	2 -024	1 -002	1 -002	
	8	0 -024	0 -024	—	—		18	1 -009	1 -009	1 -009	0 -001	
	7	0 -043	—	—	—		17	1 -021	1 -021	0 -002	0 -002	
	19	5 -019	5 -019	4 -004	4 -004		16	1 -040	0 -004	0 -004	0 -004	
	18	4 -017	4 -017	3 -004	3 -004		15	0 -008	0 -008	0 -008	—	
	17	4 -044	3 -011	2 -002	2 -002		14	0 -014	0 -014	—	—	
	16	3 -027	2 -006	2 -006	1 -001		13	0 -024	0 -024	—	—	
	15	2 -013	2 -013	1 -002	1 -002		12	0 -037	—	—	—	
	14	2 -027	1 -006	1 -006	0 -001		3	19	1 -013	1 -013	0 -001	0 -001
	13	2 -049	1 -011	0 -001	0 -001			18	1 -038	0 -003	0 -003	0 -003
12	1 -021	1 -021	0 -003	0 -003	17	0 -006		0 -006	0 -006	—		
11	1 -038	0 -006	0 -006	—	16	0 -013		0 -013	—	—		
10	0 -011	0 -011	—	—	15	0 -023		0 -023	—	—		
9	0 -020	0 -020	—	—	14	0 -036		—	—	—		
8	0 -034	—	—	—								

Significance tests in a 2 x 2 contingency table (continued)

	<i>a</i>	Probability					<i>a</i>	Probability			
		0-05	0-025	0-01	0-005			0-05	0-025	0-01	0-005
A=19 B=2	19	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻	0 .005 ⁻	A=20 B=18	15	7 .027	6 .012	5 .004	5 .004
	18	0 .014	0 .014	—	—		14	6 .026	5 .011	4 .004	4 .004
	17	0 .029	—	—	—		13	5 .024	5 .024	4 .009	3 .003
	16	0 .048	—	—	—		12	5 .047	4 .020	3 .007	2 .002
A=20 B=20	20	15 .024	15 .024	13 .004	13 .004	11	4 .041	3 .016	2 .005 ⁺	1 .001	
	19	14 .046	13 .022	12 .010 ⁻	11 .004	10	3 .033	2 .012	1 .003	1 .003	
	18	12 .032	11 .015 ⁺	10 .007	9 .003	9	2 .024	2 .024	1 .007	0 .001	
	17	11 .041	10 .020	9 .009	8 .004	8	2 .048	1 .015 ⁻	0 .003	0 .003	
	16	10 .048	9 .024	7 .005 ⁻	7 .005 ⁻	7	1 .031	0 .006	0 .006	—	
	15	8 .027	7 .012	6 .005 ⁺	5 .002	6	0 .014	0 .014	—	—	
	14	7 .028	6 .013	5 .005 ⁺	4 .002	5	0 .031	—	—	—	
	13	6 .028	5 .012	4 .005 ⁻	4 .005 ⁻	17	20	13 .036	12 .014	11 .005 ⁺	10 .002
	12	5 .027	4 .011	3 .004	3 .004		19	11 .026	10 .011	9 .004	9 .004
	11	4 .024	4 .024	3 .009	2 .003		18	10 .034	9 .015 ⁻	8 .006	7 .002
	10	4 .048	3 .020	2 .007	1 .002		17	9 .038	8 .017	7 .007	6 .003
	9	3 .041	2 .015 ⁺	1 .004	1 .004		16	8 .040	7 .018	6 .007	5 .003
	8	2 .032	1 .010 ⁻	1 .010 ⁻	0 .002		15	7 .039	6 .017	5 .007	4 .002
	7	1 .022	1 .022	0 .004	0 .004		14	6 .037	5 .016	4 .006	3 .002
	6	1 .046	0 .010 ⁺	—	—		13	5 .033	4 .013	3 .005 ⁻	3 .005 ⁻
	5	0 .024	0 .024	—	—		12	4 .028	3 .010 ⁺	2 .003	2 .003
	19	20	15 .047	14 .020	13 .008		12 .003	11	3 .022	3 .022	2 .007
		19	13 .039	12 .018	11 .008	10 .003	10	3 .042	2 .015 ⁺	1 .004	1 .004
		18	11 .026	10 .012	9 .005 ⁻	9 .005 ⁻	9	2 .031	1 .009	1 .009	0 .001
		17	10 .032	9 .015 ⁻	8 .006	7 .002	8	1 .019	1 .019	0 .003	0 .003
16		9 .036	8 .017	7 .007	6 .003	7	1 .037	0 .008	0 .008	—	
15		8 .038	7 .018	6 .008	5 .003	6	0 .017	0 .017	—	—	
14		7 .039	6 .018	5 .007	4 .003	5	0 .036	—	—	—	
13		6 .038	5 .017	4 .007	3 .002	16	20	12 .031	11 .012	10 .004	10 .004
12		5 .035 ⁺	4 .015 ⁺	3 .005 ⁺	2 .002		19	11 .049	10 .021	9 .008	8 .003
11		4 .031	3 .012	2 .004	2 .004		18	9 .026	8 .011	7 .004	7 .004
10	3 .026	2 .009	2 .009	1 .002	17		8 .028	7 .012	6 .004	6 .004	
9	2 .019	2 .019	1 .005 ⁺	0 .001	16		7 .028	6 .012	5 .004	5 .004	
8	2 .039	1 .012	0 .002	0 .002	15		6 .026	5 .011	4 .004	4 .004	
7	1 .026	0 .005 ⁺	0 .005 ⁺	—	14		5 .023	5 .023	4 .009	3 .003	
6	0 .012	0 .012	—	—	13		5 .046	4 .019	3 .007	2 .002	
5	0 .027	—	—	—	12		4 .038	3 .014	2 .004	2 .004	
18	20	14 .041	13 .017	12 .007	11 .003		11	3 .029	2 .010 ⁻	2 .010 ⁻	1 .002
	19	12 .032	11 .014	10 .006	9 .002	10	2 .020	2 .020	1 .005 ⁺	0 .001	
	18	11 .043	10 .020	9 .008	8 .003	9	2 .039	1 .011	0 .002	0 .002	
	17	10 .050 ⁻	9 .024	7 .004	7 .004	8	1 .023	1 .023	0 .004	0 .004	
	16	8 .026	7 .011	6 .005 ⁻	6 .005 ⁻	7	1 .045 ⁺	0 .009	0 .009	—	
						6	0 .020	0 .020	—	—	

The table shows:

(1) In bold type, for given *A*, *B* and *a*, the value of *b* (*b* < *a*) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given *A*, *B* and *r* = *a* + *b*, the exact probability (if there is independence) that *b* is equal to or less than the integer shown in bold type.

Significance tests in a 2 x 2 contingency table (continued)

	a	Probability					a	Probability			
		0-05	0-025	0-01	0-005			0-05	0-025	0-01	0-005
A=20 B=15	20	11 -026	10 -009	10 -009	9 -003	A=20 B=12	18	6 -018	6 -018	5 -006	4 -002
	19	10 -040	9 -016	8 -006	7 -002		17	6 -043	5 -016	4 -005-	4 -005-
	18	9 -046	8 -019	7 -007	6 -002		16	5 -034	4 -012	3 -003	3 -003
	17	8 -047	7 -020	6 -008	5 -002		15	4 -025+	3 -008	3 -008	2 -002
	16	7 -045-	6 -019	5 -007	4 -002		14	4 -049	3 -017	2 -005-	2 -005-
	15	6 -040	5 -017	4 -006	3 -002		13	3 -033	2 -010-	2 -010-	1 -002
	14	5 -034	4 -013	3 -004	3 -004		12	2 -020	2 -020	1 -005-	1 -005-
	13	4 -028	3 -010-	3 -010-	2 -003		11	2 -036	1 -009	1 -009	0 -001
	12	3 -020	3 -020	2 -006	1 -001		10	1 -018	1 -018	0 -003	0 -003
	11	3 -039	2 -013	1 -003	1 -003		9	1 -034	0 -006	0 -006	—
10	2 -026	1 -007	1 -007	0 -001	8	0 -012	0 -012	—	—		
9	2 -049	1 -015-	0 -002	0 -002	7	0 -023	0 -023	—	—		
8	1 -029	0 -005+	0 -005+	—	6	0 -043	—	—	—		
7	0 -012	0 -012	—	—							
6	0 -024	0 -024	—	—							
5	0 -048	—	—	—							
14	20	10 -022	10 -022	9 -007	8 -002	11	20	8 -037	7 -010+	6 -003	6 -003
	19	9 -032	8 -012	7 -004	7 -004		19	7 -042	6 -013	5 -004	5 -004
	18	8 -035+	7 -014	6 -005-	6 -005-		18	6 -037	5 -012	4 -003	4 -003
	17	7 -035-	6 -013	5 -005-	5 -005-		17	5 -029	4 -009	4 -009	3 -002
	16	6 -031	5 -012	4 -004	4 -004		16	4 -021	4 -021	3 -006	2 -001
	15	5 -026	4 -009	4 -009	3 -003		15	4 -042	3 -014	2 -003	2 -003
	14	4 -020	4 -020	3 -007	2 -002		14	3 -028	2 -008	2 -008	1 -001
	13	4 -040	3 -015-	2 -004	2 -004		13	2 -016	2 -016	1 -003	1 -003
	12	3 -029	2 -009	2 -009	1 -002		12	2 -029	1 -007	1 -007	0 -001
	11	2 -018	2 -018	1 -005-	1 -005-		11	1 -014	1 -014	0 -002	0 -002
10	2 -035+	1 -010-	1 -010-	0 -001	10	1 -026	0 -004	0 -004	0 -004		
9	1 -019	1 -019	0 -003	0 -003	9	1 -046	0 -008	0 -008	—		
8	1 -037	0 -007	0 -007	—	8	0 -016	0 -016	—	—		
7	0 -014	0 -014	—	—	7	0 -029	—	—	—		
6	0 -029	—	—	—							
13	20	9 -017	9 -017	8 -005+	7 -002	10	20	7 -030	6 -008	6 -008	5 -002
	19	8 -025-	8 -025-	7 -008	6 -003		19	6 -031	5 -009	5 -009	4 -002
	18	7 -026	6 -009	6 -009	5 -003		18	5 -026	4 -007	4 -007	3 -002
	17	6 -024	6 -024	5 -008	4 -002		17	4 -018	4 -018	3 -005-	3 -005-
	16	5 -020	5 -020	4 -007	3 -002		16	4 -039	3 -012	2 -003	2 -003
	15	5 -041	4 -015+	3 -005-	3 -005-		15	3 -024	3 -024	2 -006	1 -001
	14	4 -031	3 -011	2 -003	2 -003		14	3 -045+	2 -013	1 -003	1 -003
	13	3 -022	3 -022	2 -006	1 -001		13	2 -025+	1 -006	1 -006	0 -001
	12	3 -041	2 -013	1 -003	1 -003		12	2 -045-	1 -011	0 -001	0 -001
	11	2 -026	1 -007	1 -007	0 -001		11	1 -021	1 -021	0 -003	0 -003
10	2 -047	1 -013	0 -002	0 -002	10	1 -037	0 -006	0 -006	—		
9	1 -026	0 -004	0 -004	0 -004	9	0 -012	0 -012	—	—		
8	1 -047	0 -009	0 -009	—	8	0 -022	0 -022	—	—		
7	0 -018	0 -018	—	—	7	0 -038	—	—	—		
6	0 -035-	—	—	—							
12	20	9 -044	8 -014	7 -004	7 -004	9	20	6 -023	6 -023	5 -005+	4 -001
	19	7 -019	7 -019	6 -006	5 -002		19	5 -022	5 -022	4 -005+	3 -001
						18	4 -016	4 -016	3 -004	3 -004	
						17	4 -037	3 -010+	2 -002	2 -002	
						16	3 -022	3 -022	2 -005+	1 -001	
						15	3 -043	2 -012	1 -002	1 -002	
						14	2 -023	2 -023	1 -005-	1 -005-	

Significance tests in a 2 x 2 contingency table (continued)

	a	Probability					a	Probability					
		0-05	0-025	0-01	0-005			0-05	0-025	0-01	0-005		
A=20 B=9	13	2 ·041	1 ·009	1 ·009	0 ·001	A=20 B=6	14	1 ·032	0 ·004	0 ·004	0 ·004		
	12	1 ·018	1 ·018	0 ·002	0 ·002		13	0 ·007	0 ·007	0 ·007	—		
	11	1 ·032	0 ·005 ⁻	0 ·005 ⁻	0 ·005 ⁻		12	0 ·013	0 ·013	—	—		
	10	0 ·009	0 ·009	0 ·009	—		11	0 ·022	0 ·022	—	—		
	9	0 ·017	0 ·017	—	—		10	0 ·035 ⁻	—	—	—		
	8	0 ·029	—	—	—								
	7	0 ·050 ⁻	—	—	—								
	8	20	5 ·017	5 ·017	4 ·003		4 ·003	5	20	3 ·033	2 ·004	2 ·004	2 ·004
		19	4 ·015 ⁻	4 ·015 ⁻	3 ·003		3 ·003	19	2 ·016	2 ·016	1 ·002	1 ·002	
		18	4 ·038	3 ·009	3 ·009		2 ·002	18	2 ·038	1 ·005 ⁺	1 ·005 ⁺	0 ·000	
17		3 ·022	3 ·022	2 ·005 ⁻	2 ·005 ⁻	17	1 ·012	1 ·012	0 ·001	0 ·001			
16		3 ·044	2 ·011	1 ·002	1 ·002	16	1 ·023	1 ·023	0 ·002	0 ·002			
15		2 ·022	2 ·022	1 ·004	1 ·004	15	1 ·040	0 ·005 ⁻	0 ·005 ⁻	0 ·005 ⁻			
14		2 ·040	1 ·009	1 ·009	0 ·001	14	0 ·009	0 ·009	0 ·009	—			
13		1 ·016	1 ·016	0 ·002	0 ·002	13	0 ·015 ⁻	0 ·015 ⁻	—	—			
12		1 ·029	0 ·004	0 ·004	0 ·004	12	0 ·024	0 ·024	—	—			
11		1 ·048	0 ·008	0 ·008	—	11	0 ·038	—	—	—			
7	10	0 ·014	0 ·014	—	—	4	20	2 ·022	2 ·022	1 ·002	1 ·002		
	9	0 ·024	0 ·024	—	—	19	1 ·008	1 ·008	1 ·008	0 ·000			
	8	0 ·041	—	—	—	18	1 ·018	1 ·018	0 ·001	0 ·001			
	20	4 ·012	4 ·012	3 ·002	3 ·002	17	1 ·035 ⁺	0 ·003	0 ·003	0 ·003			
	19	4 ·042	3 ·009	3 ·009	2 ·001	16	0 ·007	0 ·007	0 ·007	—			
	18	3 ·024	3 ·024	2 ·005 ⁻	2 ·005 ⁻	15	0 ·012	0 ·012	—	—			
	17	3 ·050 ⁻	2 ·011	1 ·002	1 ·002	14	0 ·020	0 ·020	—	—			
	16	2 ·023	2 ·023	1 ·004	1 ·004	13	0 ·031	—	—	—			
	15	2 ·043	1 ·009	1 ·009	0 ·001	12	0 ·047	—	—	—			
	14	1 ·016	1 ·016	0 ·002	0 ·002	3	20	1 ·012	1 ·012	0 ·001	0 ·001		
13	1 ·029	0 ·004	0 ·004	0 ·004	19	1 ·034	0 ·002	0 ·002	0 ·002				
12	1 ·048	0 ·007	0 ·007	—	18	0 ·006	0 ·006	0 ·006	—				
11	0 ·013	0 ·013	—	—	17	0 ·011	0 ·011	—	—				
10	0 ·022	0 ·022	—	—	16	0 ·020	0 ·020	—	—				
9	0 ·036	—	—	—	15	0 ·032	—	—	—				
6	20	4 ·046	3 ·008	3 ·008	2 ·001	14	0 ·047	—	—	—			
	19	3 ·028	2 ·005 ⁻	2 ·005 ⁻	2 ·005 ⁻	2	20	0 ·004	0 ·004	0 ·004	0 ·004		
	18	2 ·013	2 ·013	1 ·002	1 ·002	19	0 ·013	0 ·013	—	—			
	17	2 ·028	1 ·004	1 ·004	1 ·004	18	0 ·026	—	—	—			
	16	1 ·010 ⁻	1 ·010 ⁻	1 ·010 ⁻	0 ·001	17	0 ·043	—	—	—			
	15	1 ·018	1 ·018	0 ·002	0 ·002	1	20	0 ·048	—	—	—		

The table shows:

(1) In bold type, for given A , B and a , the value of b ($<a$) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given A , B and $r=a+b$, the exact probability (if there is independence) that b is equal to or less than the integer shown in bold type.