

Goodness of Fit Tests Using Excel

Example #23 p.566 The significance is 0.01. The alternative hypothesis is that not all months are equally likely. The data below represents the number of false fire alarms reported in a given month.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Alarms	32	15	37	38	45	48	46	42	34	36	28	26

Open an Excel spreadsheet. Enter the number of alarms in cells A3 through A14. Compute the expected value, which is just the mean of the values in A3 through A14. Copy the expected value into cells B3 through B14.

Enter the formulas shown in cells D3 through D14 in the neighboring cells, C3 through C14. The dollar sign (\$) next to 1 means the formula will always refer back to the first cell in column C. If the dollar sign is used in this manner, the formula in C3 can be copied and pasted into C4 through C14, and the resulting formulas will be as shown in D4 through D14. Of course, you will only see the values computed by Excel in C3 through C14.

Similarly, the formulas shown in D16 and D17 should be entered in C16 and C17. Note that the CHISQ.TEST formula uses the lists of numbers in columns A and B.

	A	B	C	D	E
1		Exp. Val.	35.38	=AVERAGE(A3:A14)	
2	Obs.				
3	32	35.38	0.36	=(A3-C\$1)^2/C\$1	
4	15	35.38	11.91	=(A4-C\$1)^2/C\$1	
5	37	35.38	0.06	=(A5-C\$1)^2/C\$1	
6	38	35.38	0.16	=(A6-C\$1)^2/C\$1	
7	45	35.38	2.49	=(A7-C\$1)^2/C\$1	
8	48	35.38	4.33	=(A8-C\$1)^2/C\$1	
9	46	35.38	3.05	=(A9-C\$1)^2/C\$1	
10	42	35.38	1.16	=(A10-C\$1)^2/C\$1	
11	34	35.38	0.07	=(A11-C\$1)^2/C\$1	
12	36	35.38	0.00	=(A12-C\$1)^2/C\$1	
13	28	35.38	1.62	=(A13-C\$1)^2/C\$1	
14	26	35.38	2.58	=(A14-C\$1)^2/C\$1	
15					
16		Test Stat	27.79	=SUM(C4:C15)	
17		P-Value	0.0035	=CHISQ.TEST(A3:A14,B3:B14)	
18					

Again, the most important values here are the test statistic, 27.79, and the P-value, 0.0035. Since the P-value, 0.0035, is less than the significance, 0.01, the null hypothesis is rejected. The conclusion would be that, with 99% confidence, the evidence is strong enough to say that not all months are equally likely.