

Testing Independence in a 2-d table with R

```
> math =  
read.table("http://www.utstat.toronto.edu/~brunner/312f12/code_n_data/mathcat.data")  
> math[1:5,]  
  hsgpa hsengl hscalc  course passed outcome  
1  78.0    80    Yes Mainstrm    No  Failed  
2  66.0    75    Yes Mainstrm    Yes Passed  
3  80.2    70    Yes Mainstrm    Yes Passed  
4  81.7    67    Yes Mainstrm    Yes Passed  
5  86.8    80    Yes Mainstrm    Yes Passed  
> attach(math) # Variable names are now global  
> calcpass = table(hscalc,passed); calcpass  
      passed  
hscalc No Yes  
  No   17  4  
  Yes 141 232  
> help(chisq.test)  
starting httpd help server ... done  
> chisq.test(calcpass,correct=F) # Don't correct for continuity
```

Pearson's Chi-squared test

```
data: calcpass  
X-squared = 15.4111, df = 1, p-value = 8.648e-05
```

```
> test1 = chisq.test(calcpass,correct=F) # Save the test object
```

```
> test1$expected
```

```
      passed  
hscalc    No    Yes  
  No    8.42132 12.57868  
  Yes 149.57868 223.42132
```

```
> n = sum(calcpass); (17+4)*(17+141)/n # Checking expected freq  
[1] 8.42132
```

```
> test1$stdres # Standardized residuals
```

```
      passed  
hscalc    No    Yes  
  No    3.925692 -3.925692  
  Yes -3.925692  3.925692
```

```

> # Likelihood ratio test uses the same expected frequencies
> freq = calcpass; muhat = test1$expected
> G2 = 2*sum(freq*log(freq/muhat)); G2 # Compare X2 = 15.41
[1] 15.54447
> pval = 1-pchisq(G2,1); pval
[1] 8.058708e-05

```

```

>
> courseout = table(course,outcome); courseout

```

course	Disappeared	Failed	Passed
Catch-up	21	6	8
Elite	2	5	24
Mainstrm	74	50	204

```

> test2 = chisq.test(courseout)

```

Warning message:

In chisq.test(courseout, correct = F) :
Chi-squared approximation may be incorrect

```

> test2

```

Pearson's Chi-squared test

data: courseout

X-squared = 32.4943, df = 4, p-value = 1.516e-06

```

> test2$expected

```

course	Disappeared	Failed	Passed
Catch-up	8.616751	5.418782	20.96447
Elite	7.631980	4.799492	18.56853
Mainstrm	80.751269	50.781726	196.46701

```

>

```

```

> test2$stdres

```

course	Disappeared	Failed	Passed
Catch-up	5.0901853	0.2845216	-4.6841760
Elite	-2.4462856	0.1037180	2.0736869
Mainstrm	-2.1142521	-0.2915432	2.0735694

Compared to students in the Elite and Mainstream courses, students in the Catch-up course were more likely to disappear and less likely to pass.