

AP[®] Statistics (Operational) 2004 Sample Student Responses

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5. A rural county hospital offers several health services. The hospital administrators conducted a poll to determine whether the residents' satisfaction with the available services depends on their gender. A random sample of 1,000 adult county residents was selected. The gender of each respondent was recorded and each was asked whether he or she was satisfied with the services offered by the hospital. The resulting data are shown in the table below.

	Male	Female	Total
Satisfied	384	416	800
Not Satisfied	80	120	200
Total	464	536	1,000

(a) Using a significance level of 0.05, conduct an appropriate test to determine if, for adult residents of this county, there is an association between gender and whether or not they were satisfied with services offered by the hospital.

Ho: Gender and satisfaction of services are independent.
Ho bender and satisfaction of services are dependent.

Assumptions: 1) The sample is random 4 we must assume independence

2)			Total
41	M	All	800
2	394	1/120 8)	Ç -
16	(371.2)	1420.0	- 4.00
KIS	80	120	200
NS	(92.8)	(107.2)	
	464	536	1000

All expected counts 25

Expected =
$$\frac{(row)(eolomn)}{(grand)} = \frac{(464)(800)}{1000} = 371.2 = \frac{(464)(200)}{1000} = 92.8 = \frac{(536)(800)}{1000} = 428.8 = \frac{(536)(200)}{1000} = 107.2$$

$$\frac{(464)(200)}{1000} = 92.8$$

$$\frac{(536)(200)}{1000} = 107.2$$

Frocedure x2 test for independence

T.S.
$$\chi^2 = \frac{(obs-exp)^2}{(exp)} = \frac{(384-371.2)^2}{371.2} + \frac{(416-428.8)^2}{478.8} + \frac{(80-92.8)^2}{92.8} + \frac{(120-107.2)^2}{107.2} = 4.117$$



P=.0424

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If you need more room for your work to part (a), use the space below.

Conclusion: & Since $p \leq \infty$, reject Ho! at the $\infty = .05$ significance level, there is sufficient evidence to indicate that gender and satisfaction of services are not independent.

(b) Is $\frac{800}{1,000}$ a reasonable estimate for the proportion of all adult county residents who are satisfied with the services offered by this hospital? Explain why or why not.

This is a reasonable estimate for the proportion of all adult county residents who are satisfied with services offered by the hospital because it is a random tample a we were not notified in the given data of any bias (measurement, selection, etc.)

5. A rural county hospital offers several health services. The hospital administrators conducted a poll to determine whether the residents' satisfaction with the available services depends on their gender. A random sample of 1,000 adult county residents was selected. The gender of each respondent was recorded and each was asked whether he or she was satisfied with the services offered by the hospital. The resulting data are shown in the table below.

	Male	Female	Total
Satisfied	384	416	800
Not Satisfied	80	120	200
Total	464	536	1,000

(a) Using a significance level of 0.05, conduct an appropriate test to determine if, for adult residents of this county, there is an association between gender and whether or not they were satisfied with services offered by the hospital.

test of

Ho: There is no association between gender and whether or not they were satisfined Ha! There is an association between gender and wetver or vot they were satisfined

Assumption

All expocted

counts are

greater than

5

$$\chi^{2} = \underbrace{\frac{(0-\epsilon)^{2}}{\epsilon}}_{2}$$

$$\chi^{2} = \underbrace{\frac{(384-3712)^{2}}{571.2}}_{4102} + \underbrace{\frac{(410c-428.8)^{2}}{428.8}}_{438.8} + \underbrace{\frac{(80-92.8)^{2}}{92.8}}_{1002} + \underbrace{\frac{(120-107.2)^{2}}{428.8}}_{1002}$$

 $\alpha = .05$ $\chi^2 = 4.1173 \rightarrow p = .0424 df = 1$

We reject to therefore there is an association between gender and whether or not they were southfred with sorvices aftered bythe hospital.

If you need more room for your work to part (a), use the space below.

(b) Is $\frac{800}{1,000}$ a reasonable estimate for the proportion of all adult county residents who are satisfied with the services offered by this hospital? Explain why or why not.

yes A 13 a reasonable estimate because It was a random sample of that population. Also n=1000 is a large sample , so the resulting proportion is close to the true proportion.

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