

College Prep Stats

11.3 Extra Practice

1. Achievement and School Location Is achieving a basic skill level in a subject related to the location of the school? The results of a random sample of students by the location of school and the number of those students achieving basic skill levels in three subjects is shown in the contingency table. At $\alpha = 0.05$, test the hypothesis that the variables are independent. (Adapted from HUD State of the Cities Report)

Location of school	Subject		
	Reading	Math	Science
Urban	43	42	38
Suburban	63	66	65

a) State the null hypothesis and the alternative hypothesis.

b) Calculate the test statistic.

c) Determine the p -value.

d) What is the conclusion?

2. Attitudes about Safety The results of a random sample of students by type of school and their attitudes on safety steps taken by the school staff are shown in the contingency table. At $\alpha = 0.01$, can you conclude that attitudes about the safety steps taken by the school staff are related to the type of school? (Adapted from Horatio Alger Association)

Type of school	School staff has	
	Taken all steps necessary for student safety	Taken some steps toward student safety
Public	40	51
Private	64	34

a) State the null hypothesis and the alternative hypothesis.

b) Calculate the test statistic.

c) Determine the p -value.

d) What is the conclusion?

3. Trying to Quit Smoking The contingency table shows the number of times a random sample of former smokers tried to quit smoking before they were habit-free and gender. At $\alpha = 0.05$, can you conclude that the number of times they tried to quit before they were habit-free is related to gender? (Adapted from Porter Novelli Health Styles for the American Lung Association)

Gender	Number of times tried to quit before habit-free		
	1	2-3	4 or more
Male	271	257	149
Female	146	139	80

a) State the null hypothesis and the alternative hypothesis.

b) Calculate the test statistic.

c) Determine the p -value.

d) What is the conclusion?

4. Reviewing a Movie The contingency table shows how a random sample of adults rated a newly released movie and gender. At $\alpha = 0.05$, can you conclude that the adults' ratings are related to gender?

Gender	Rating			
	Excellent	Good	Fair	Poor
Male	97	42	26	5
Female	101	33	25	11

a) State the null hypothesis and the alternative hypothesis.

b) Calculate the test statistic.

c) Determine the p -value.

d) What is the conclusion?

5. Musculoskeletal Injury The results of a random sample of children with pain from musculoskeletal injuries treated with acetaminophen, ibuprofen, or codeine are shown in the contingency table. At $\alpha = 0.01$, can you conclude that the treatment is related to the result? (Adapted from American Academy of Pediatrics)

Result	Treatment		
	Acetaminophen	Ibuprofen	Codeine
Significant improvement	58	81	61
Slight improvement	42	19	39

a) State the null hypothesis and the alternative hypothesis.

b) Calculate the test statistic.

c) Determine the p -value.

d) What is the conclusion?

6. Motor Vehicle Crash Deaths The contingency table shows the results of a random samples of motor vehicle crash deaths by age and gender. At $\alpha = 0.05$, perform a homogeneity of proportions test on the claim that the proportions of motor vehicle crash deaths involving males or females are the same for each age group. (Adapted from Insurance Institute for Highway Safety)

Gender	Age							
	16–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and older
Male	123	97	82	82	56	31	26	14
Female	46	28	28	32	22	18	18	7

a) State the null hypothesis and the alternative hypothesis.

b) Calculate the test statistic.

c) Determine the p -value.

d) What is the conclusion?

7. Obsessive-Compulsive Disorder The contingency table shows the results of a random sample of patients with obsessive-compulsive disorder after being treated with a drug or with a placebo. At $\alpha = 0.05$, perform a homogeneity of proportions test on the claim that the proportions of the results for drug and placebo treatments are the same. (Adapted from The Journal of the American Medical Association)

Result	Treatment	
	Drug	Placebo
Improvement	39	25
No change	54	70

a) State the null hypothesis and the alternative hypothesis.

b) Calculate the test statistic.

c) Determine the p -value.

d) What is the conclusion?