

Additional Exercises

1. A sales manager for an insurance company believes that customers have the following preferences for life insurance products: 50% prefer Whole Life, 25% prefer Universal Life, and 25% prefer Life Annuities. A survey of 250 customers produced the following results.

Life Insurance Preferences	
Product	Number
Whole Life	60
Universal Life	100
Life Annuities	90

- a. Is the sales manager's claim refuted by the data at $\alpha = 0.05$?
- b. What assumptions were made in the test for part a.?
2. Do you think there are people somewhat like us living on other planets in the universe? The responses to this question, which was asked in several different calendar years, were summarized in the *Gallup Poll Monthly*. For the year 1978, 51% answered "Yes," 33% "No," and the remainder had no opinion.² Suppose that a sample of 100 people is chosen in 2018 in order to determine if opinions have changed concerning extraterrestrial life. Assume that the same question is asked and that 42 answer "Yes," 30 "No," and that the rest have no opinion. Assuming that the percentages given above accurately represent the attitudes of the people in 1978, can we conclude with $\alpha = 0.05$ that people's attitudes toward extraterrestrial life have changed since 1978?
3. A traffic engineer feels that on a certain four-lane highway, the probability of being in the innermost lane is twice as great as any of the other lanes. Assume the other lanes have equal probabilities. A random sample of 200 motorists is chosen and the lanes in which they are traveling in are noted. The results (Lane 1 is the innermost lane) are given in the following table.

Traffic Lanes				
Lane	1	2	3	4
Frequency	55	45	62	38

- a. Find the probabilities implied by the engineer's claim that a randomly chosen motorist will be in each of the four lanes.
- b. With $\alpha = 0.05$, can we refute the claim of the traffic engineer?
4. The National Restaurant Association is interested in determining if there is a relationship between the type of pizza Americans prefer and the region of the country in which they live. The association randomly selects 285 Americans and records the category of pizza which best describes their preference and the region of the country in which they live with the following results.

Pizza Preference				
Type of Pizza Preferred	Region			
	North	South	East	West
Thin Crust	40	30	35	45
Thick Crust	17	15	21	22
Pan Pizza	15	15	15	15

- a. Can the association conclude that the type of pizza Americans prefer and the region of the country in which they live are dependent at $\alpha = 0.10$?
 - b. What assumptions were made in the test for part a.?
5. Amazon asked consumers to assign star ratings to different brands of staplers. The results are summarized in the table below.

Amazon Stapler Ratings					
Brand	Star Rating				
	5 Star	4 Star	3 Star	2 Star	1 Star
Swingline Optima 40 Compact	589	60	22	15	60
PaperPro inPower	485	60	40	20	60
Rapid Classic K1 Plier Stapler	312	26	11	7	15
EcoElectronix Electric Stapler	361	45	14	5	27
Bostitch Ascend 3 in 1	378	66	44	22	38

- a. Can it be concluded that star rating and stapler brand are dependent at $\alpha = 0.10$?
- b. What assumptions were made in the test for part a.?