# AE 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.

**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.** Consider the following proportions of wives having affairs and husbands having affairs reported in *What the Odds Are* by Les Kranz.

**Affairs**

| | Wives | Husbands |
|---|---|---|
| **Have an Affair Before 2 Years of Marriage** | 0.13 | 0.14 |
| **Have an Affair Between 2 and 10 Years of Marriage** | 0.20 | 0.25 |
| **Have an Affair After 10 Years of Marriage** | 0.20 | 0.33 |
| **Have Not Had an Affair** | 0.47 | 0.28 |

**a.** If the results were based on a survey of 200 wives and 200 husbands, do the data suggest that the proportion of wives in the various categories who have had affairs differs significantly from the proportion of husbands in the various categories who have had affairs at $\alpha = 0.10$?

**b.** What assumptions were made in the test for part **a.**?

**3.** Do you think there are people somewhat like ourselves 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. Suppose that a sample of 100 people is chosen in 2011 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 of toward extraterrestrial life have changed since 1978?

**4.** 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?

**5.** According to the Statistical Abstract of the United States, 22.6% of those 18 and over in the U.S. in 1992 were never married, 61.1% were married, 7.5% were widowed, and 8.8% were divorced. Suppose the following table summarizes the marital status of 90 randomly chosen adults in 2011.

| Marital Status | | | | |
|---|---|---|---|---|
| | **Never Married** | **Married** | **Widowed** | **Divorced** |
| **Frequency** | 27 | 42 | 10 | 11 |

With $\alpha = 0.01$, can we conclude that in 2011 the U.S. is different than in 1992, with respect to marital status?

**6.** The National Restaurant Association is interested in determining if there is a relationship between the type of pizza pie Americans prefer and the region of the country in which they live. The association randomly selects 285 Americans and records the category of pizza pie which best describes their preference and the region of the country in which they live with the following results.

| Pizza Preference | | | | |
|---|---|---|---|---|
| | **Region** | | | |
| **Type of Pizza Pie Preferred** | **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 pie 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.**?

**7.** Do you think marriages between homosexuals should or should not be recognized by law as valid with the same rights as traditional marriages? The responses to this question and the region of the country where the respondent lived were summarized in the *Gallup Poll Monthly*. The following contingency table summarizes the 799 responses.

**Poll Results**

| | Response | | |
|---|---|---|---|
| **Region** | **Should** | **Should Not** | **No Opinion** |
| **East** | 78 | 136 | 16 |
| **Midwest** | 63 | 183 | 16 |
| **South** | 74 | 23 | 16 |
| **West** | 50 | 138 | 6 |

With $\alpha = 0.01$, can we conclude that attitude about homosexual marriages is dependent on region?

**8.** Consider the following data regarding the percentage of mobile application usage and smartphone operating system. Suppose the data were based off of 100 responses.

**Mobile App Usage (%)**

| **Operating System** | **Multiple Times a Day** | **Once a Day** | **Several Times a Week** |
|---|---|---|---|
| **Apple iOS** | 68 | 11 | 16 |
| **Android OS** | 60 | 12 | 21 |
| **Palm OS** | 48 | 14 | 25 |
| **Blackberry OS** | 45 | 13 | 29 |
| **Microsoft Windows Mobile** | 29 | 21 | 43 |
| **Other** | 47 | 13 | 21 |

**a.** Is there evidence that the frequency of mobile app usage is dependent on the smartphone operating system? Test at $\alpha = 0.05$.

**b.** What assumptions are made for the test in part **a.**? Are the assumptions reasonable for this problem? Why or why not?