Determine which χ2 test is appropriate for each situation and then actually run the test. AP Statistics

 χ2 Goodness of Fit χ2 Test for Homogeneity χ2 Test for Independence

1. A random sample of men and a random sample of women are asked if they take a daily vitamin. The results are given in the table. Does it appear that the distribution differs for the two groups?

|  |  |  |
| --- | --- | --- |
|  | Vitamin daily | No vitamin daily |
| Men | 20 | 25 |
| Women | 17 | 19 |

2. A random sample of U.S. residents was chosen. They were categorized according to where they live (Northeast, Southeast, Midwest, Southwest, Northwest) and their favorite type of vacation (beach, mountains, amusement park, other). Does it appear that region of residence and favorite vacation are related?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Northeast | Southeast | Midwest | Southwest | Northwest |
| Beach | 117 | 209 | 186 | 213 | 512 |
| Mountains | 129 | 182 | 219 | 301 | 201 |
| Amusement park | 157 | 195 | 158 | 132 | 273 |
| Other  | 125 | 127 | 131 | 170 | 101 |

3. A group of young adults is chosen and asked which of a selection of prizes they would choose if given the chance. A group of older adults were asked the same question. Here are the results:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Cash | Vacation | Car  |
| Young adults | 15 | 10 | 8 |
| Older adults | 17 | 19 | 12 |

Do the distributions appear to be the same for the two groups?

4. Professor Markel typically has a grade distribution of 15% A’s, 35% B’s, 35% C’s, 10% D’s, 5% F’s in his Introduction to American Literature course. This semester his class has the following grades: 10 A’s, 9 B’s, 18 C’s, 5 D’s, 8 F’s. Does this semester’s distribution seem to deviate from the typical distribution?

5. Ten years ago, a study was done at a manufacturing plant to determine when most of the injuries occurred. They found that 30% occurred during the morning shift, 30% during the afternoon shift and 40% during the evening shift. A random sample of injuries was chosen from this year and when they occurred was recorded. The results were as follows: 19 occurred during the morning shift, 27 during the afternoon shift, and 38 during the evening shift. Does it appear that the distribution has changed in the past 10 years?

6. Samuel and Joseph both work the floor at an appliance store. The sales for the past quarter are recorded as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Refrigerator | Dishwasher | Washing Machine | Other |
| Samuel | 3 | 7 | 6 | 10 |
| Joseph | 11 | 8 | 2 | 7 |

Does it appear that the distributions differ for the two employees?

7. The counseling department at Mann High School chose a random sample of 100 juniors and a random sample of 100 seniors and asked them about their post high school plans. The results are recorded below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | College | Work | Military | Other |
| Juniors | 60 | 10 | 10 | 20 |
| Seniors | 49 | 15 | 12 | 24 |

Do the distributions appear to be the same for the two groups?

8. A geneticist claims that four species of fruit flies should appear in the ratio 1:3:3:9. Suppose that a sample of 4000 flies contained 226, 764, 733 and 2277 flies of each species, respectively. Is there sufficient evidence that the geneticist is incorrect?

9. A medical researcher tests 640 heart attack victims for the presence of a certain antibody in their blood and cross-classifies against the severity of the attack. The results are reported in the following table.

|  |
| --- |
|  Severity of attack |
|  | Severe | Medium | Mild |
| Antibody present | 85 | 125 | 150 |
| Antibody not present | 40 | 95 | 145 |

Is there evidence of a relationship between presence of the antibody and the severity of the heart attack?