**Ch 11 Chi-Square**

Chi-Square Independence (comparing categorical variables in a single population)

*Are the variables independent? Note\* Dependence suggests a pattern and implies causation. When variables fail the test for independence they are “associated”. Not being independent does not mean dependent.*

1. A study examined whether the risk of hepatitis C was related to whether people had tattoos and to where they got their tattoos.

|  |  |  |
| --- | --- | --- |
|  | *Hepatitis C* | *No Hepatitis C* |
| *Tattoo, parlor* | *17* | *35* |
| *Tattoo, elsewhere* | *8* | *53* |
| *None* | *22* | *491* |

Chi-Square Test of Homogeneity (comparing observed distributions)

*Are the groups homogeneous? (same variable, different populations)*

1. A survey was conducted to the graduating class of 4 colleges within a university in upstate NY.

Are the students’ choices of post-graduating plans the same across all colleges?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Agriculture | Arts & Sciences | Engineering | Social Science |
| Employed | 379 | 305 | 243 | 125 |
| Grad School | 186 | 239 | 202 | 96 |
| Other | 104 | 123 | 37 | 58 |

Chi-Square Goodness of Fit (comparing to a theoretical model)

1. Some researchers have proposed that children who are the older ones in their class at school may naturally perform better in sports. Could that make a difference in who makes it to the professional level in sports? Test whether the observed distribution of ballplayers’ birth month shows random fluctuation or whether it represents a real deviation from the national pattern.

(Data for 1,478 MLB players from 1975-2006)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Month | Ballplayer  Count | National birth % | Month | Ballplayer  Count | National birth % |
| 1 | 137 | 8 | 7 | 102 | 9 |
| 2 | 121 | 7 | 8 | 165 | 9 |
| 3 | 116 | 8 | 9 | 134 | 9 |
| 4 | 121 | 8 | 10 | 115 | 9 |
| 5 | 126 | 8 | 11 | 105 | 8 |
| 6 | 114 | 8 | 12 | 122 | 9 |

1. Does your zodiac sign predict how successful you will be later in life?

*Fortune* magazine collected zodiac signs of 256 heads of the largest 400 companies.

|  |  |  |  |
| --- | --- | --- | --- |
| Sign | Births | Sign | Births |
| Aries | 23 | Libra | 18 |
| Taurus | 20 | Scorpio | 21 |
| Gemini | 18 | Sagittarius | 19 |
| Cancer | 23 | Capricorn | 22 |
| Leo | 20 | Aquarius | 24 |
| Virgo | 19 | Pisces | 29 |

1. Many states and localities now collect data on traffic stops regarding the race of the driver. The initial concern was that Black drivers were being stopped more often. Data from 2533 traffic stops in Cincinnati report the race of the driver and whether the traffic stop resulted in a search of the vehicle.

Examine whether race is a factor in vehicle searches.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Black | White | Other |
| No Search | 787 | 594 | 27 |
| Searched | 813 | 293 | 19 |

1. The table below shows the rank attained by male and female officers in the NYPD. Do these indicate that men and women are equitably represented at all levels of the department?

|  |  |  |
| --- | --- | --- |
|  | Male | Female |
| Officer | 21900 | 4281 |
| Detective | 4058 | 806 |
| Sergeant | 3898 | 415 |
| Lieutenant | 1333 | 89 |
| Captain | 359 | 12 |
| Higher ranks | 218 | 10 |