Problem 1

A bank company is investigating the risk of late payment for its issued credit cards from two populations: young adults vs old seniors. The observed frequencies showing the number of samples with late payment and the number of samples without late payment for the past six months are as follows:

|  |  |  |
| --- | --- | --- |
|  | Young Adults | Old Seniors |
| Late Payment | 74 | 48 |
| No Late Payment | 606 | 632 |
| Total | 680 | 680 |

1. What are the late payment rates for each group from the sample?

b. What is the relative risk (risk ratio) of late payment for young adults compared to old seniors?

c. What is the odds ratio of late payment for young adults compared to old seniors? How do we determine which group had higher late payment rate based on your calculation?

d. Use the Chi-squared test procedure to see if there is a significant difference between the population late payment rates for the two groups. In this practice do not consider continuity correction. Given alpha=0.05. Please provide statistical hypotheses , the calculated value of Chi-square statistic , p-value and your conclusion.

e. Now, let’s consider continuity correction. Given alpha=0.05, what is the calculated Chi-squared statistic , p-value and your conclusion ?

Problem 2

M&M’s candy milk chocolate candies come in a variety of colors. The over proportions for the colors are 0.2 blue, 0.1 brown, 0.18 green, 0.17 orange, 0.15 red, and 0.2 yellow. In a sampling survey, several bags of M&M’s milk chocolates were opened, and the color counts were obtained in the file *MM5.xlsx*. Use a 0.05 level of significance and the sample data to test the hypothesis that the overall proportions for the colors are as stated above. Please provide the statistical hypotheses , the calculated value of Chi-square statistic , the critical value for the test , and your conclusion.

Problem 3

Social media is becoming more and more popular around the world. Statista.com provides estimates of the number of social media users in various countries in 2017 as well as the projections for 2022. Assume that the results for surveys in the United Kingdom, China, Russia, and the United States are stored in the file *SocialMedia6.xlsx*.

a. What are the sample proportion of adults using social media for each of the four countries?

b. Conduct a hypothesis test to determine whether the proportion of adults using social media is equal for all four countries. (4%) What is the critical value given alpha=0.05? What is the p-value? Using a .05 level of significance, what is your conclusion?

Problem 4

A J. D. Power and Associates vehicle quality survey asked new owners a variety of questions about their recently purchased automobile. One question asked for the owner's rating of the vehicle using categorical responses of average, outstanding, and exceptional. Another question asked for the owner's education level with the categorical responses some high school, high school graduate, some college, and college graduate. Assume the sample data in the file *AutoQuality6.xlsx* are for a sample of owners who had recently purchased an automobile.

Use a .05 level of significance and a test of independence to determine if a new owner's vehicle quality rating is independent of the owner's education. Develop the statistical hypotheses. What is the degree of freedom? What is the p-value and what is your conclusion ?