Homework 10: Ref Chapter 10

Hypothesis Testing in Categorical Data

**Homework 10: April 12, Winter 2022**

**HW10.1**

A pharmaceutical company wanted to test the effective of a new drug in controlling the severity of diabetes. It compared the new drug with an existing one, which was taken as a placebo. It considered two independent samples and randomly assigned one group to treat with new drug and the other with the placebo. After a two-week period of study, it evaluated patient for the severity of the diabetes. In the group treated with the new drug, 41 patients out of 65 was evaluated in control of their diabetes, whereas in the placebo group, 26 patients out of 55 was evaluated to be in control. The company believes that the new drug would have better performance in controlling diabetes. Let be the unknown proportion of patients who would have received evaluation of control in the severity of diabetes due to two treatments, new drug and placebo.

1. Set up the null and alternative hypothesis for this test that best suited for the situation described.
2. What test should you use for this test?
3. Write out the test statistic and compute the value of the test statistic.
4. What is the p-value for this test?
5. What is your conclusion in regard to the effectiveness of the two options of the treatment in controlling the severity of the diabetes?

**HW10.2**

**Ref: Table 10.45, Page 453**

Dry eye is the most prevalent form of ocular discomfort and irritation, with approximately 20 million people in the United States having mild to moderate dry eye. A small clinical trial was performed to compare the effectiveness of an active drug vs. placebo for relieving symptoms of dry eye. Specifically, patients were randomized to either active drug or placebo for 2 weeks. They then came for a clinic visit where they were exposed to a chamber with a controlled adverse environment (CAE) for 90 minutes (with low humidity intended to exacerbate symptoms of dry eye). The patients were then asked to report their degree of discomfort while in the CAE using the following scale: (0 = none, 1 = intermittent awareness, 2 = constant awareness, 3 = intermittent discomfort, 4 = constant discomfort).

The results degree of discomfort by treatment group are shown in Table below.

| **treatment** | **discomfort** | | | |
| --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **Total** |
| **Drug** | |  | | --- | | 6 | | |  | | --- | | 17 | | |  | | --- | | 37 | | |  | | --- | | 60 | |
| **Placebo** | |  | | --- | | 2 | | |  | | --- | | 13 | | |  | | --- | | 44 | | |  | | --- | | 59 | |
| **Total** | |  | | --- | | 8 | | |  | | --- | | 30 | | |  | | --- | | 81 | | |  | | --- | | 119 | |

We wish to test

1. Read above data table in SAS.
2. Perform a test of hypothesis of no association between treatment and ocular discomfort at birth at 5% level of significance.
3. What test should you use?
4. Report the value of the test statistic and p-value for the test.
5. Make a conclusion about the test at 5% level of significance.

**HW10.3**

**Ref: Table 10.26 Page 441**

Improving control of blood-glucose levels is an important motivation for the use of insulin pumps by diabetic patients. However, certain side effects have been reported with pump therapy. The Table below provides data on the occurrence of diabetic ketoacidosis (DKA) in patients before (bpTherapy) and after start of pump therapy (apTherapy).

Table: Occurrence of DKA in patients before and after start of insulin-pump therapy

| **bTheray** | **aTheray** | | |
| --- | --- | --- | --- |
| **NoDKA** | **DKA** | **Total** |
| **NoDKA** | |  | | --- | | 128 | | |  | | --- | | 7 | | |  | | --- | | 135 | |
| **DKA** | |  | | --- | | 19 | | |  | | --- | | 7 | | |  | | --- | | 26 | |
| **Total** | |  | | --- | | 147 | | |  | | --- | | 14 | | |  | | --- | | 161 | |

1. Read the data in SAS.
2. Find a point estimate of Cohen’s Kappa agreement.
3. Find an estimate of the SE (ASE) of Kappa agreement.
4. 95% CI of Cohen’s Kappa agreement.
5. Test of hypothesis no Kappa agreement at 10% level of significance