1. Locate the results of a recent survey that shows at least **two variables** in a newspaper, magazine, or Internet article. X
2. Outline the survey data so that your peers can understand the variables and results, and then **identify at least one key formula from this module that you could use to evaluate the data**. X
3. Provide a brief explanation of why you selected the formula you did and why it matters. X
4. **Explain what the formula is, where it is in the textbook (give chapter and section), and clearly define your parameters**. X
   1. Section 11.4 “Test of Independence”

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YouGov conducted a nationwide survey on November 17, 2020 that surveyed 7245 US adults (YouGov PLC, 2020). The survey asked: “How much, if at all, would you trust a COVID-19 vaccine from the drug maker Moderna?” Respondents could select a trust level: 1) Trust a lot; 2) Somewhat trust; 3) Would not trust very much; 4) Would not trust at all; 5) Don’t know. Responses were segmented by region (Northeast, Midwest, South, and West). The results can be understood by a test of independence (Section 11.4) to find whether or not there is a relationship between trust level and region (Holmes et al., 2018). The hypotheses are:

Region and trust level are independent of each other.

Region and trust level are dependent on each other.

We can understand the hypotheses through the lenses of a contingency table:

The rows are independent of the columns and vice versa.

The rows are dependent on the columns or vice versa.

The formula for the test statistic is the sum of *i⋅ j* terms where *O* represents the observed frequency for a table entry, *E* represents the expected frequency for a table entry, *i* the table row count, and *j* the table column count:

**test-statistic formula.**

**Frequency tables.**

We can use Excel to find the χ² right tail area using =CHISQ.DIST.RT(sums of chi-square, degrees of freedom). The degrees of freedom can be found by multiplying the row count minus 1 by the column count minus 1. Using the following formula, we can calculate the sums of chi-square:

**formula**

This gives us =CHISQ.DIST.RT(898.42, 12) which returns 1.2546E-184.

The p-value is less than the level of significance, 0.5, thus we would reject *Ho.* We would reject that the region and trust level are independent of each other.

References

Holmes, A., Illowsky, B., & Dean, S. (2018). *Introductory Business Statistics* (1st ed.). OpenStax.

YouGov. (2020). *Health, Medicine, & Beauty*. YouGov PLC. Retrieved November 17, 2020, from <https://today.yougov.com/topics/health/survey-results/daily/2020/11/17/e47ac/1>

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YouGov conducted a nationwide survey on November 17, 2020 that surveyed 7,245 U.S. adults (YouGov PLC, 2020). The survey asked: “How much, if at all, would you trust a COVID-19 vaccine from the drug maker Moderna?” Respondents could select a trust level: 1) Trust a lot; 2) Somewhat trust; 3) Would not trust very much; 4) Would not trust at all; 5) Don’t know. Responses were segmented by region (Northeast, Midwest, South, and West). The results can be understood by a test of independence (Section 11.4) to find whether or not there is a relationship between trust level and region (Holmes et al., 2018). The hypotheses are: H0: Region and trust level are independent of each other.HA: Region and trust level are dependent on each other.The hypotheses can be viewed through the lens of a contingency table:H0: The rows are independent of the columns and vice versa.HA: The rows are dependent on the columns or vice versa. The formula for the test statistic is the sum of i⋅ j terms where O represents the observed frequency for a table entry, E represents the expected frequency for a table entry, i the table row count, and j the table column count: Observed and Expected Frequencies: A test of independence is a right-tailed hypothesis test. We can use Excel to find the χ² right tail area using =CHISQ.DIST.RT(test statistic, degrees of freedom). The degrees of freedom can be found by multiplying the row count minus 1 by the column count minus 1. Using the results of these calculations as parameters, this gives us =CHISQ.DIST.RT(898.42, 12) which returns 1.2546E-184. The p-value is less than the level of significance, 0.5, thus we would reject Ho. We would reject that the region and trust level are independent of each other.ReferencesHolmes, A., Illowsky, B., & Dean, S. (2018). Introductory Business Statistics (1st ed.). OpenStax.YouGov. (2020). Health, Medicine, & Beauty. YouGov PLC. Retrieved November 17, 2020, from https://today.yougov.com/topics/health/survey-results/daily/2020/11/17/e47ac/1