Distracted Driving

Distracted driving—defined as any activity that could divert a person's attention away from the primary task of driving—includes activities such as talking or texting, eating and drinking, talking to people in your vehicle, fiddling with the stereo, entertainment or navigation system, and rubbernecking. Distracted drivers are 23 times more likely to crash than non-distracted drivers[1] and costs taxpayers as much as $175 billion a year[2].

When it comes to laws to curb distracted driving, many states have focused on the use of handheld devices while driving. In 2019, Minnesota became the 23rd state to pass legislation banning the use of handheld devices while driving. State lawmakers often cite safety statistics—use of handheld devices causes an accident every 24 seconds[3]; novice drivers are 8.3 times more likely to crash while talking on the phone[4]—and the increased numbers of accidents due to "driving while in-text-icated" as rationale for these laws. The goal of this assignment is to answer the following research question:

> Has there been an increase over time in fatal distracted driving crashes that involved cell phone use by the driver?

To help answer this research question, the National Highway Traffic Safety Administration (NHTSA) has provided the following information:

- **Base Rate:** In 2010, 12% of all fatal crashes attributed to distracted driving involved cell phone use by the driver.
- **Observed Data:** In 2017, 401 of 2,843 fatal crashes attributed to distracted driving involved cell phone use by the driver.[5]

All questions are worth 1 point unless otherwise noted.

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[1] U.S. Department of Transportation (2012). *Driver distraction in commercial vehicle operations*.
[2] National Highway Traffic Safety Administration. (2010). *The economic and societal impact of motor vehicle crashes*.
[3] National Safety Council. (2010). *Understanding the distracted brain*.
[4] Klauer, S. G.; Guo, F.; Simons-Morton, B. G.; Ouimet, M. C.; Lee, S. E.; Dingus, T. A. (2014). Distracted driving and risk of road crashes among novice and experienced drivers. *New England Journal of Medicine, 370* (1), 54–59.
[5] Data are from https://www.iii.org/table-archive/23890

Explore the Observed Data

1. Does the observed percentage for the data provided by the NHTSA suggest that fatal distracted driving crashes involving cell phone use by the driver have increased? Explain your reasoning.

Model

To answer the research question, you will set up a TinkerPlots sampler that models the variation in the number of fatal distracted driving crashes involving cell phone use by the driver that you would expect in 2017 using the base rate.

2. Set up a TinkerPlots sampler that corresponds to the model that is described above. Copy and paste or sketch the sampler window into your word-processed document.

3. Write the statistical hypothesis that describes the model in your TinkerPlots sampler.

Simulate from the Model

Use TinkerPlots to generate the 500 samples of fatal distracted driving crashes. Collect the number of crashes that involved cell phone use by the driver from each trial of the simulation.

Evaluate the Observed Results

4. Use formal statistical language to describe the shape of the distribution of simulated results.

5. Compute and report the mean number of crashes involving cell phone use by the driver expected under the hypothesized model. Explain how this relates to the statistical hypothesis you wrote in Question #2. **(2pts)**

6. Compute and report the standard deviation and use it to determine a range of likely values. Show your work. **(2pts)**

7. Use TinkerPlots to add a reference line on your plot of 500 trials at the observed value and add a divider to the plot to show the range of likely values. Copy and paste your plot with the reference line and divider or draw a rough outline of your plot below. **(2pts)**

8. Based on the variation you described in Question #6 and your observed value, is the observed result from 2017 compatible under the hypothesized model? Explain. **(2pts)**

Answer the Research Question
9. Write a short note to the NHTSA that answers the research question. In your response, use the statistical evidence from your simulation to explain how you came to the conclusion you did. You should also include recommendations you believe for steps the NHTSA should take going forward. **(3 pts)**