Assignment # 8

#1: Willingness to Pay for water efficiency

You conduct an online survey among 280 California residents about their willingness to pay for investment in a new almond production technology that is more water efficient. The results show that the willingness to pay to save one gallon of water per pound of almonds produced, varies from -3 dollars to 15 dollars with an average of 8 dollars and a standard deviation of 1.5 dollars. Construct a 95% confidence interval for the dollar willingness to pay for one gallon of water saved per household in your state.

Step 1: The given confidence level is 95% (which consequently means the significance level is 5%).

Step 2: Compute $\bar{x}$ and $SE(\bar{x})$

$$\bar{x} = 8$$
$$SE(\bar{x}) = \sqrt{\tfrac{1}{280}1.5^2} = \sqrt{\tfrac{1}{280}}1.5 = tba$$

Step 3: Critical value: two-sided, significance level is 0.05, and 279 degrees of freedom: $c = 1.96$

Step 4: Plug these values into our formula for confidence intervals and interpret:

$$[8 - 1.96(tba), 8 + 1.96(tba)]$$
$$[tba, tba]$$

Given our data, there is a 95% chance that this interval contains the population average willingness to pay for saving one gallon for pounds of almonds produced. (Whatever way you interpret it, make sure *not* to imply that the true value is a random variable!)

2: 2018 plastic bag ballot proposition

Prop 67 : A Yes vote approves, and a No vote rejects, a statute that prohibits grocery and other stores from providing customers single-use plastic or paper carryout bags but permits sale of recycled paper bags and reusable bags. Fiscal Impact: Relatively small fiscal effects on state and local governments, including a minor increase in state administrative costs and possible minor local government savings from reduced litter and waste management costs. In a poll of 117 online survey respondents, you find that 64% of the respondents state that they are in favor of prop 67. Build a 95% confidence interval for the percentage of the population that is in favor of the Proposition 67.

Solution: Our sample estimate is $\hat{p} = .64$, which has $SE(\hat{p}) = \sqrt{\frac{.64(1-.64)}{117}} = tba$. There are 116 degrees of freedom here, and we can use the normal table to find that the $c = 1.96$.

$$[.64 - 1.96(tba), .64 + 1.96(tba)] = \quad [tba, tba]$$

There is a 95% chance that the interval [tba,tba] covers the true population of people who support the bag tax.

#3: Case 1 contin from Lecture

Case Study 1: A Resources for the Future Survey in 2019.

Random National sample N=1000, with Partisan divisions as follows:
N=300-230-350 Democrats-Republicans-independents

Question "Global Warming is a very serious problem for the US ? YES/ NO .
51% of a national random sample of N=1000 adults surveyed said Yes. the percent of democrats agreeing is in the second column in the figure below and the sample size of republican- democrat and independent split is as follows

(a) Please construct a 95 % confidence interval for democrats agreeing with "Global Warming is a very serious problem for the US ?

Solution: N=300. Our sample estimate for democrats is $\hat{p} = .78$, which has $SE(\hat{p}) = \sqrt{\frac{.78(1-.78)}{300}}$. There are 229 degrees of freedom here, and we can use the normal table to find that the $c = 1.96$.

$$\left[.78 - 1.96 * \sqrt{\frac{.78(1-.78)}{300}}), .78 + 1.96 * (\sqrt{\frac{.78(1-.78)}{300}})\right]$$

Figure 1: Resources For the Future Survey - Some Results