Homework 13 Chapter 21 (Problems 1 to 4)

Due on April 28

Math 125 *Kovitz* Spring 2025

1. A simple random sample of 3,600 persons is taken to estimate the percentage of Republicans among the 52,000 eligible voters in a certain city. It turns out that 2,817 people in the sample are Republicans. The goal is to find a 95%-confidence interval for the percentage of Republicans among all 52,000 eligible voters.

   (a) The 2,817 is the _____ value for the number of Republicans in the sample. Options: (i) expected (ii) observed

   (b) The SD of the box is _____ $\sqrt{0.7825 \times 0.2175}$. Options: (i) exactly equal to (ii) estimated from the data as

   (c) The SE for the percentage of Republicans in the sample is _____ 0.6876%. Options: (i) exactly equal to (ii) estimated from the data as

   (d) Now find a 95%-confidence interval for the percentage of eligible voters in the city who are Republicans.

2. (a) Probabilities are used when reasoning from the _____ to the _____; confidence levels are used when reasoning from the _____ to the _____. Options: box draws

   (b) The confidence interval is for the _____ percentage. Options: sample population

3. A simple random sample of 1,000 persons is taken to estimate the percentage of Republicans in a large population. It turns out that 732 of the people in the sample are Republicans. True or false, and explain.

   (a) The sample percentage is $(732/1{,}000) \times 100\% = 73.2\%$; the SE for the sample percentage is 1.4%.

   (b) The percentage of Republicans in the population can be estimated as 73.2%; the SE is 1.4%.

   (c) The 1.4% measures the likely size of the chance error in the estimate.

   (d) The 73.2% is likely to be off the percentage of Republicans in the population, by 1.4% or so.

   (e) $73.2\% \pm 2.8\%$ is a 95%-confidence interval for the population percentage.

   (f) $73.2\% \pm 2.8\%$ is a 95%-confidence interval for the sample percentage.

   (g) There is about a 95% chance for the percentage of Republicans in the population to be in the range $73.2\% \pm 2.8\%$.

4. A simple random sample of 500 students at UMass Boston was taken to estimate the percentage of all students at the University who owned a dog or cat. Of the students in the sample, 34.8% had a dog or cat.

   (a) True or false: It is not possible to get a confidence interval here; there is only one sample; that is not enough to estimate the population percentage. Another sample is needed.

   (b) If you answered false to part (a), find a 95%-confidence interval for the percentage of students at UMass Boston who owned a dog or cat.