UNIVERSITY OF TEXAS AT AUSTIN

Problem Set # 4
Sampling variability.

Problem 4.1. A public opinion poll in Ohio wants to determine whether registered voters in the state approve of a measure to ban smoking in all public areas. They select a simple random sample of 50 registered voters from each county in the state and ask whether they approve or disapprove of the measure. The proportion of registered voters in the state who approve of banning smoking in public areas is an example of a …

    a.: …parameter.
    b.: …statistic.

Solution: a.

Problem 4.2. (5 points) Dr. Theodore Gauss conducts a survey. He draws a random sample of 100 citizens of Whoburgh. He finds that **winter** is the absolute favorite season for 88% of the surveyed citizens. In this situation, 88% is …

    a.: …a the point estimate.
    b.: …statistic.
    c.: …parameter.

Solution: a.

Problem 4.3. You are wondering what proportion of coffee drinkers in Austin put sugar into their coffee. You plan to poll 50 coffee drinkers, count how many put sugar into their coffee, and divide that number by 50. The value you are going to get is a …

    a.: …parameter.
    b.: …statistic.

Solution: b.

Problem 4.4. <u>Car dealers</u>
A *simple random sample* of 1000 Americans found that 61% were satisfied with the service provided by the dealer from which they bought their car. A simple random sample of 1000 Canadians found that 58% were satisfied with the service provided by the dealer from which they bought their car. The sampling variability associated with these statistics is …
a. about the same.
b. much smaller for the sample of Canadians since the population of Canada is smaller than that of the United States, hence the sample is a larger proportion of the population.
c. much larger for the Canadians since Canada has a lower population density than the United States, hence Canadians tend to live farther apart which always increases sampling variability.

Solution: a.
As long as the population is much larger than the sample, samples of the same size will have about the same variability. The additional information supplied in this answer is unrelated to the question of interest. The physical distance between people need not, in general, have any effect on sampling variability.

Problem 4.5. (5 points) Your friend Cyril works as a work-study for the statistics department. The chair of the department decides Cyril's weekly pay by spinning a spinner which is equally likely to land on red, yellow, or blue. If the spinner lands on yellow, Cyril gets $0. If the spinner lands on red, Cyril gets $400. If the spinner lands on blue, Cyril gets $500. What is the probability that Cyril's average pay in the following three weeks is $300?

Solution: If the average pay is \$300, that means that the total pay is \$900. The only way that can happen is if Cyril gets the payments of $(0, 400, 500)$ or some permutation thereof. Every one of these combinations of payments has the probability $1/27$ and there are $3! = 6$ of them. So, the total probability is $6/27 = 2/9$.