AP Statistics   Name_____
Unit 05 – Distributions   Period_____
Day 01 – Homework #1 (Sampling Distributions)

For problems 1 & 2, identify the population, the parameter, the sample, and the statistic in each setting.

1. A random sample of 1000 people who signed a card saying they intended to quit smoking were contacted 9 months later. It turned out that 210 (21%) of the sampled individuals had not smoked over the past 6 months.

    Population:

    Parameter:

    Sample:

    Statistic:

2. Tom is cooking a large turkey breast for a holiday meal. He wants to be sure that the turkey is safe to eat, which requires a minimum internal temperature of 165 degrees Fahrenheit. Tom uses a thermometer to measure the temperature of the turkey meat at four randomly chosen points. The minimum reading in the sample is 170 degrees Fahrenheit.

    Population:

    Parameter:

    Sample:

    Statistic:

For each boldface number in problems 3 & 4, state whether it is a parameter or a statistic and then use appropriate notation to describe each number.

3. A large container is full of ball bearings with mean diameter 2.5003 centimeters (cm). This is within the specifications for acceptance of the container by the purchaser. By chance, an inspector chooses 100 bearings from the container that have mean diameter 2.5009 cm. Because this is outside the specified limits, the container is mistakenly rejected.

4. Voter registration records show that 41% of voters in a state are registered Democrats. To test a random digit dialing device, you use it to call 250 randomly chosen residential telephones in the state. Of the registered voters contacted, 33% are registered Democrats.

5. A school newspaper article claims that 60% of the students at a large high school did all their assigned homework last week. Some skeptical AP Statistics students want to investigate whether this claim is true, so they choose an SRS of 100 students from the school to interview. What values of the sample proportion $\hat{p}$ would be consistent with the claim that the population proportion of students who completed all their homework is p = 0.60? To find out, we used Fathom software to simulate choosing 250 SRSs of size n = 100 students from a population in which p = 0.60. The figure below is a dotplot of the sample proportion $\hat{p}$ of students who did all their homework.
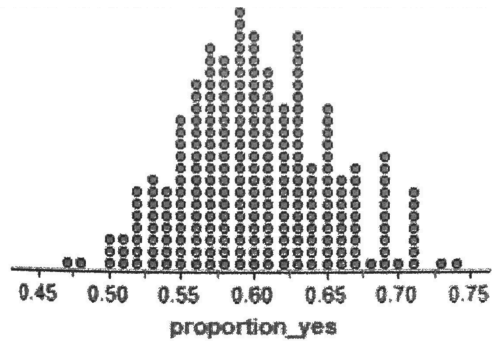
a. There is one dot on the graph at 0.73. Explain what this value represents.

b. Describe the distribution. Are there any obvious outliers?

c. Would it be surprising to get a sample proportion of 0.45 or lower in an SRS of size 100 when p = 0.60? Justify your answer.

d. Suppose that 45 of the 100 students in the actual sample say that they did all their homework last week. What would you conclude about the newspaper article's claim? Explain.

6. A study of the health of teenagers plans to measure the blood cholesterol levels of an SRS of 13- to 16-year-olds. The researchers will report the mean $\bar{x}$ from their sample as an estimate of the mean cholesterol level μ in this population.

    a. Explain to someone who knows little about statistics what it means to say that $\bar{x}$ is an unbiased estimator of μ.

    b. The sample mean $\bar{x}$ us an unbiased estimator of the population mean μ no matter what size SRS the study chooses. Explain to someone who knows nothing about statistics why a large random sample will give more trustworthy results than a small random sample.

7. The Internal Revenue Service plans to examine an SRS of individual federal income tax returns. The parameter of interest is the proportion of all returns claiming itemized deductions. Which would be better for estimating this parameter: an SRS of 20,000 returns or an SRS of 2000 returns? Justify your answer.