AP Statistics   Problem Set #1

Identify the population, the parameter, the sample, and the statistic in questions 1-3.

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

2. Each month, the Current Population Survey interviews a random sample of individuals in about 55,000 U.S. households. One of their goals is to estimate the national unemployment rate. In December 2009, 10.0% of those interviewed were unemployed.

3. 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°F. Tom uses a thermometer to measure the temperature of the turkey neat at four randomly chosen points. The minimum reading in the sample is 170°F.

*In each **boldface** number in questions 4 & 5, (1) state whether it is a parameter or a statistic and (2) use appropriate notation to describe each number, for example p = 0.65.*

4. Florida has played a key role in recent presidential elections. Voter registration records show that **41%** of Florida voters are Democrat. To test a random digit dialing device, you use it to call 250 randomly chosen residential telephones in Florida. Of the registered voters contacted, **33%** were registered Democrats.

5. A random sample of female college students has a mean height of **64.5** inches, which is greater than the **63**-inch mean height of all American women.

6. According to the National Center for health Statistics, the distribution of heights for 16-year old females is modeled well by a normal distribution with mean $\mu = 64$ inches and standard deviation $\sigma = 2.5$ inches. To see if this distribution applies at their high school, an AP Statistics class takes an SRS of 20 of the 300 16-year old females at the school and measures their heights. What values of the sample mean $\bar{x}$ would be consistent with the population distribution being *N(64, 2.5)*? To find out, the teacher use Fathom software to simulate choosing 250 SRSs of size *n* = 20 students from a population that is *N(64, 2.5)*. The figure shows is a dotplot of the sample mean height $\bar{x}$ of the students in the sample.

62.0 62.5 63.0 63.5 64.0 64.5 65.0 65.5 66.0
xbar
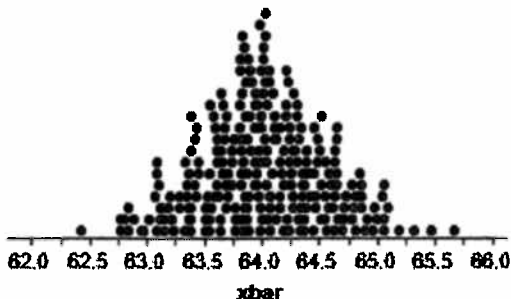
(a) Is this the sampling distribution of $\bar{x}$? Justify your answer.
(b) Describe the distribution. Are there any obvious outliers?
(c) The average height of the 20 girls in the AP Statistics student's actual sample was $\bar{x}$ = 64.7 inches. What would you conclude about the population mean height μ for 16-year old females at the school? Explain.

7. 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 no statistics what it means to say that $\bar{x}$ is an unbiased estimator of μ.
(b) The sample result $\bar{x}$ is an unbiased estimator of the population mean μ no matter what size SRS the study chooses. Explain to someone who knows no statistics why a large random sample gives more trustworthy results than a small random sample.