1. Barron's reported that the average number of weeks an individual is unemployed is 17.5 weeks (Barron's, February 18, 2008). Assume that for the population of all unemployed individuals the population mean length of unemployment is 17.5 weeks and that the population standard deviation is 4 weeks. Suppose you would like to select a random sample of 50 unemployed individuals for a follow-up study.
    a. Show the sampling distribution of , the sample mean average for a sample of 50 unemployed individuals.
    b. What is the probability that a simple random sample of 50 unemployed individuals will provide a sample mean within 1 week of the population mean?
    c. What is the probability that a simple random sample of 50 unemployed individuals will provide a sample mean within 1/2 week of the population mean?

2. The College Board reported the following mean scores for the three parts of the Scholastic Aptitude Test (SAT) (The World Almanac, 2009):

Critical Reading	502
Mathematics	515
Writing	494

    Assume that the population standard deviation on each part of the test is σ _ 100.
    a. What is the probability a random sample of 90 test takers will provide a sample mean test score within 10 points of the population mean of 502 on the Critical Reading part of the test?
    b. What is the probability a random sample of 90 test takers will provide a sample mean test score within 10 points of the population mean of 515 on the Mathematics part of the test? Compare this probability to the value computed in part (a).
    c. What is the probability a random sample of 100 test takers will provide a sample mean test score within 10 of the population mean of 494 on the writing part of the test? Comment on the differences between this probability and the values computed in parts (a) and (b).

3. The mean annual cost of automobile insurance is $939 (CNBC, February 23, 2006). Assume that the standard deviation is $\sigma = \$245$.
    i. What is the probability that a simple random sample of automobile insurance policies will have a sample mean within $25 of the population mean for each of the following sample sizes: 30, 50, 100, and 400?
    ii. What is the advantage of a larger sample size when attempting to estimate the population mean?

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4. BusinessWeek conducted a survey of graduates from 30 top MBA programs (BusinessWeek, September 22, 2003). On the basis of the survey, assume that the mean annual salary for male and female graduates 10 years after graduation is $168,000 and $117,000, respectively. Assume the standard deviation for the male graduates is $40,000, and for the female graduates it is $25,000.
    a. What is the probability that a simple random sample of 40 male graduates will provide a sample mean within $10,000 of the population mean, $168,000?
    b. What is the probability that a simple random sample of 40 female graduates will provide a sample mean within $10,000 of the population mean, $117,000?
    c. In which of the preceding two cases, part (a) or part (b), do we have a higher probability of obtaining a sample estimate within $10,000 of the population mean? Why?
    d. What is the probability that a simple random sample of 100 male graduates will provide a sample mean more than $4000 below the population mean?

5. The average score for male golfers is 95 and the average score for female golfers is 106 (Golf Digest, April 2006). Use these values as the population means for men and women and assume that the population standard deviation is $\sigma = 14$ strokes for both. A simple random sample of 30 male golfers and another simple random sample of 45 female golfers will be taken.
    a. Show the sampling distribution of for male golfers.
    b. What is the probability that the sample mean is within 3 strokes of the population mean for the sample of male golfers?
    c. What is the probability that the sample mean is within 3 strokes of the population mean for the sample of female golfers?
    d. In which case, part (b) or part (c), is the probability of obtaining a sample mean within 3 strokes of the population mean higher? Why?

6. The average price of a gallon of unleaded regular gasoline was reported to be $2.34 in northern Kentucky (The Cincinnati Enquirer, January 21, 2006). Use this price as the population mean, and assume the population standard deviation is $.20.

    a. What is the probability that the mean price for a sample of 30 service stations is within $.03 of the population mean?
    b. What is the probability that the mean price for a sample of 50 service stations is within $.03 of the population mean?
    c. What is the probability that the mean price for a sample of 100 service stations is within $.03 of the population mean?
    d. Which, if any, of the sample sizes in parts (a), (b), and (c) would you recommend to have at least a .95 probability that the sample mean is within $.03 of the population mean?