Worksheets

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Statistics 1A
PSBE1-08

1 Week 5

1. A population has a mean of 50 and a standard deviation of 6.
   (a) What are the mean and standard deviation of the sampling distribution of the mean for $n = 16$?
   (b) What are the mean and standard deviation of the sampling distribution of the mean for $n = 20$?
2. Given a test that is normally distributed with a mean of 100 and a standard deviation of 12, find:
   (a) the probability that a single score drawn at random will be greater than 110.
   (b) the probability that a sample of 25 scores will have a mean greater than 105.
   (c) the probability that a sample of 64 scores will have a mean greater than 105.
   (d) the probability that the mean of a sample of 16 scores will be either less than 95 or greater than 105.
3. What term refers to the standard deviation of the sampling distribution?
4. (a) If the standard error of the mean is 10 for $n = 12$, what is the standard error of the mean for $n = 22$?
   (b) If the standard error of the mean is 50 for $n = 25$, what is it for $n = 64$?
5. A questionnaire is developed to assess women's and men's attitudes toward using animals in research. One question asks whether animal research is wrong and is answered on a 7-point scale. Assume that in the population, the mean for women is 5, the mean for men is 4, and the standard deviation for both groups is 1.5. Assume the scores are normally distributed. If 12 women and 12 men are selected randomly, what is the probability that the mean of the women will be more than 1.5 points higher than the mean of the men?
6. A normal distribution has a mean of 20 and a standard deviation of 10. Two scores are sampled randomly from the distribution and the second score is subtracted from the first. What is the probability that the difference score will be greater than 5?
7. If you sample one number from a standard normal distribution, what is the probability it will be 0.5?
8. A variable is normally distributed with a mean of 120 and a standard deviation of 5. Four scores are randomly sampled. What is the probability that the mean of the four scores is above 127?
9. The mean GPA for students in School A is 3.0; the mean GPA for students in School B is 2.8. The standard deviation in both schools is 0.25. The GPAs of both schools are normally distributed. If 9 students are randomly sampled from each school, what is the probability that:
   (a) the sample mean for School A will exceed that of School B by 0.5 or more?
   (b) the sample mean for School B will be greater than the sample mean for School A?
10. In a city, 70% of the people prefer Candidate A. Suppose 30 people from this city were sampled.
    (a) What is the mean of the sampling distribution of p?
    (b) What is the standard error of p?
    (c) What is the probability that 80% or more of this sample will prefer Candidate A?
    (d) What is the probability that 45% or more of this sample will prefer some other candidate?

11. In the population, the mean SAT score is 1000. Would you be more likely (or equally likely) to get a sample mean of 1200 if you randomly sampled 10 students or if you randomly sampled 30 students? Explain.

12. True/false: The standard error of the mean is smaller when $n = 20$ than when $n = 10$.

13. True/false: You choose 20 students from the population and calculate the mean of their test scores. You repeat this process 100 times and plot the distribution of the means. In this case, the sample size is 100.

14. True/false: In your school, 40% of students watch TV at night. You randomly ask 5 students every day if they watch TV at night. Every day, you would find that 2 of the 5 do watch TV at night.

15. True/false: The median has a sampling distribution.

16. A certain town is served by two hospitals. In the larger hospital, about 45 babies are born each day. In the smaller one, about 15 babies are born each day. Although the overall proportion of girls is about 50%, the actual proportion at either hospital may be greater or less on any day. At the end of a year, which hospital will have the greater number of days on which more than 60% of the babies born were girls?

    (a) the large hospital

    (b) the smaller hospital

    (c) neither - the number of these days will be about the same.

17. The numerical population of grade point averages at a college has mean 2.61 and standard deviation 0.5. If a random sample of size 100 is taken from the population, what is the probability that the sample mean will be between 2.51 and 2.71?