

4. A distribution of scores has  $\sigma = 6$ , but the value of the mean is unknown. A researcher plans to select a sample from the population in order to learn more about the unknown mean.
- If the sample consists of a single score ( $n = 1$ ), how accurately should the score represent the population mean? That is, how much error, on the average, should the researcher expect between the score and the population mean?
  - If the sample consists of  $n = 9$  scores, how accurately should the sample mean represent the population mean?
  - If the sample consists of  $n = 36$  scores, how much error, on the average, would be expected between the sample mean and the population mean?
5. A population has  $\mu = 60$  and  $\sigma = 10$ . Find the z-score corresponding to each of the following sample means:
- A sample of  $n = 4$  with  $\bar{X} = 55$
  - A sample of  $n = 25$  with  $\bar{X} = 64$
  - A sample of  $n = 100$  with  $\bar{X} = 62$
7. A normal population has  $\mu = 100$  and  $\sigma = 20$ .
- Sketch the distribution of sample means for random samples of  $n = 25$ .
  - Using z-scores, find the boundaries that separate the middle 95% of the sample means from the extreme 5% in the tails of the distribution.
  - A sample mean of  $\bar{X} = 106$  is computed for a sample of  $n = 25$  scores. Is this sample mean in the extreme 5%?
12. Scores on a personality test form a normal distribution with  $\mu = 80$  and  $\sigma = 12$ . If a random sample of  $n = 16$  people is selected and the mean score is computed for this sample, then
- Sketch the distribution of all the possible sample means that could be obtained.
  - Of all the possible sample means, what proportion will be greater than 85?
  - What proportion of the sample means will be less than 83?
  - What proportion of the sample means will be less than 74?
  - Of all the possible sample means, what proportion will be within 4 points of the population mean? (That is, what proportion will be between 76 and 84?)
15. A population of scores forms a normal distribution with  $\mu = 75$  and  $\sigma = 12$ .
- What is the probability of obtaining a random sample of  $n = 4$  scores with a sample mean that is within 5 points of the population mean? That is, find  $p(70 < \bar{X} < 80)$ .
  - For a sample of  $n = 16$  scores, what is the probability of obtaining a sample mean that is within 5 points of the population mean?
20. The average age for registered voters in the county is  $\mu = 39.7$  years with  $\sigma = 11.8$ . The distribution of ages is approximately normal. During a recent jury trial in the county courthouse, a statistician noted that the average age for the 12 jurors was  $\bar{X} = 50.4$  years.
- How likely is it to obtain a jury this old or older by chance?
  - Is it reasonable to conclude that this jury is not a random sample of registered voters?
22. A researcher evaluated the effectiveness of relaxation training in reducing anxiety. One sample of anxiety-ridden people received relaxation training, while a second sample did not. Then anxiety scores were measured for all subjects, using a standardized test. Use the information that is summarized in the following table to complete this exercise:
- Construct a bar graph that incorporates all of the information in the table.
  - Looking at your graph, do you think the relaxation training really worked? Explain your answer.

The effect of relaxation training on anxiety scores

GROUP	MEAN ANXIETY SCORE	SE
Control group	36	7
Relaxation training	18	5