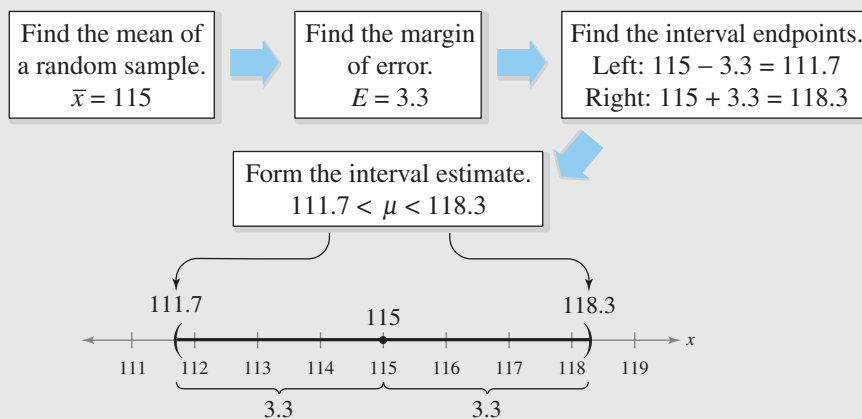In Chapters 1 through 5, you studied descriptive statistics (how to collect and describe data) and probability (how to find probabilities and analyze discrete and continuous probability distributions). For instance, psychologists use descriptive statistics to analyze the data collected during experiments and trials.

One of the most commonly administered psychological tests is the Wechsler Adult Intelligence Scale. It is an intelligence quotient (IQ) test that is standardized to have a normal distribution with a mean of 100 and a standard deviation of 15.

WHERE YOU'RE GOING ▶▶

In this chapter, you will begin your study of inferential statistics—the second major branch of statistics. For instance, a chess club wants to estimate the mean IQ of its members. The mean of a random sample of members is 115. Because this estimate consists of a single number represented by a point on a number line, it is called a point estimate. The problem with using a point estimate is that it is rarely equal to the exact parameter (mean, standard deviation, or proportion) of the population.

In this chapter, you will learn how to make a more meaningful estimate by specifying an interval of values on a number line, together with a statement of how confident you are that your interval contains the population parameter. Suppose the club wants to be 90% confident of its estimate for the mean IQ of its members. Here is an overview of how to construct an interval estimate.

| Find the mean of a random sample. $\bar{x} = 115$ | ➡ | Find the margin of error. $E = 3.3$ | ➡ | Find the interval endpoints. Left: $115 - 3.3 = 111.7$ Right: $115 + 3.3 = 118.3$ |

Form the interval estimate.
$111.7 < \mu < 118.3$

So, the club can be 90% confident that the mean IQ of its members is between 111.7 and 118.3.

T. Dr. A's U. S. K.

Things Dr. Anglin Says U   Should   Know
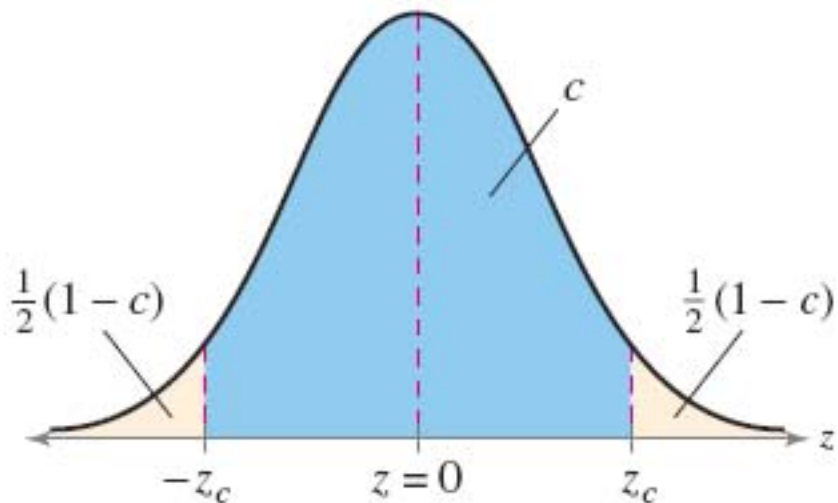
Level of Confidence	z_c
90%	1.645
95%	1.96
99%	2.575

$$\frac{1}{2}(1-c) \qquad c \qquad \frac{1}{2}(1-c)$$

$$-z_c \qquad z=0 \qquad z_c$$

Level of Confidence

Confidence Intrevals Practice

Practice Problems – answer completely.

1) I randomly select 25 students' Math SAT scores and find $\bar{X}$ =600. I know that σ from this population is 50. Find a 95% Confidence Interval and interpret.

2) I randomly select 25 students' Math SAT scores and find $\bar{X}$ =600. I know that σ from this population is 50. Find a 90% Confidence Interval and interpret..

3) I randomly select 25 students' Math SAT scores and find $\bar{X}$ =600. I know that σ from this population is 50. Find a 99% Confidence Interval and interpret.

4) I randomly select 100 students' Math SAT scores and find $\bar{X}$ =600. I know that σ from this population is 50. Find a 99% Confidence Interval and interpret.

5) You sample 12 bugs and find the sample mean is 2.40 cm. You are told that σ =0.2 cm. Find a 95% Confidence Interval and interpret.

6) You sample 16 students in your school, and they average 13 hours of TV a week. Assume σ = 3. Find a 99% Confidence Interval and interpret.

7) You are testing chocolate chip cookies to estimate the mean number of chips per cookie. You sample 25 cookies and you find a sample mean of 10 chips per cookie. Assume σ = 2. Find a 95% confidence interval and interpret.

8) You are testing whether students at your school are overweight. You sample 25 students and measure how much more they weigh than the average weight for their height. The mean of your sample is 5 lbs, and we know that σ = 5. Find a 90% Confidence Interval and interpet.

9) A new sneaker claims that it can make male athletes jump higher. A sample of 25 male athletes is asked to jump once with their own sneakers on and once wearing the new sneakers. The average jump increased by 1.5 inches with the new sneakers! Assume that σ = 3. Find a 95% confidence interval and interpret.

10) Suppose you administer a certain aptitude test to a random sample of 9 students in your school, and that the average score is 105. We want to determine the mean μ of the population of all students in the school. Assume a standard deviation of σ = 15 for the test. Perform a 99% CI and interpret.

Confidence Intrevals Practice

11) Just some general questions:

    a) Increasing my confidence level will _____ the margin of error and therefore will also _____ the width of my confidence interval.

    b) Increasing my sample size will _____ the margin of error and therefore will also _____ the width of my confidence interval.

    c) Do you think we can perform a 100% Confidence Interval? How about 99.999% C.I.?

12) True or False

a) A 90% CI for test scores is (80, 87). This means that the average score for the population is most likely 83.5	
b) A 90% CI for test scores is (80, 87). This means that 90% of all scores fall in this range.	
c) A 90% CI for test scores is (80, 87). This means that we are 90% confident that the population mean is in this range.	
d) If we double our sample size, our confidence interval width will be cut in half.	
e) If we increase our confidence level, we will increase our margin of error.	