decrease the sample size to n = 25 instead of n = 36?

- $EBM = \left(z_{\frac{\alpha}{2}}\right) \left(\frac{\sigma}{\sqrt{n}}\right)$
- σ = 3; The confidence level is 90% (*CL*=0.90); $z_{\frac{\alpha}{2}} = z_{0.05} = 1.645$.

Solution

If we **increase** the sample size *n* to 100, we **decrease** the error bound.

When
$$n = 100$$
: $EBM = \left(z_{\frac{\alpha}{2}}\right) \left(\frac{\sigma}{\sqrt{n}}\right) = (1.645) \left(\frac{3}{\sqrt{100}}\right) = 0.4935$.

Solution

If we **decrease** the sample size *n* to 25, we **increase** the error bound.

When
$$n = 25$$
: $EBM = \left(z_{\frac{\alpha}{2}}\right) \left(\frac{\sigma}{\sqrt{n}}\right) = (1.645) \left(\frac{3}{\sqrt{25}}\right) = 0.987$.

Summary: Effect of Changing the Sample Size

- Increasing the sample size causes the error bound to decrease, making the confidence interval narrower.
- Decreasing the sample size causes the error bound to increase, making the confidence interval wider.

>

TRY IT 8.5

Refer back to the pizza-delivery Iry It exercise. The mean delivery time is 36 minutes and the population standard deviation is six minutes. Assume the sample size is changed to 50 restaurants with the same sample mean. Find a 90% confidence interval estimate for the population mean delivery time.

Working Backwards to Find the Error Bound or Sample Mean

When we calculate a confidence interval, we find the sample mean, calculate the error bound, and use them to calculate the confidence interval. However, sometimes when we read statistical studies, the study may state the confidence interval only. If we know the confidence interval, we can work backwards to find both the error bound and the sample mean.

Finding the Error Bound

- · From the upper value for the interval, subtract the sample mean,
- OR, from the upper value for the interval, subtract the lower value. Then divide the difference by two.

Finding the Sample Mean

- Subtract the error bound from the upper value of the confidence interval,
- OR, average the upper and lower endpoints of the confidence interval.

Notice that there are two methods to perform each calculation. You can choose the method that is easier to use with the information you know.

EXAMPLE 8.6

Suppose we know that a confidence interval is (67.18, 68.82) and we want to find the error bound. We may know that the sample mean is 68, or perhaps our source only gave the confidence interval and did not tell us the value of the sample mean.

Calculate the Error Bound:

- If we know that the sample mean is 68: EBM = 68.82 68 = 0.82.
- If we don't know the sample mean: $EBM = \frac{(68.82 67.18)}{2} = 0.82.$