ESTIMATION

ESTIMATION: AN INTRODUCTION

Definition

The assignment of value(s) to a population parameter based on a value of the corresponding sample statistic is called ***estimation***.

ESTIMATION: AN INTRODUCTION cont.

Definition

The value(s) assigned to a population parameter based on the value of a sample statistic is called an ***estimate***.

The sample statistic used to estimate a population parameter is called an ***estimator***.

ESTIMATION: AN INTRODUCTION cont.

The estimation procedure involves the following steps.

1. Select a sample.
2. Collect the required information from the members of the sample.
3. Calculate the value of the sample statistic.
4. Assign value(s) to the corresponding population parameter.

POINT AND INTERVAL ESTIMATES

- A Point Estimate
- An Interval Estimate

A Point Estimate

Definition

The value of a sample statistic that is used to estimate a population parameter is called a ***point estimate***.

A Point Estimate cont.

- Usually, whenever we use point estimation, we calculate the margin of error associated with that point estimation.
- The margin of error is calculated as follows:

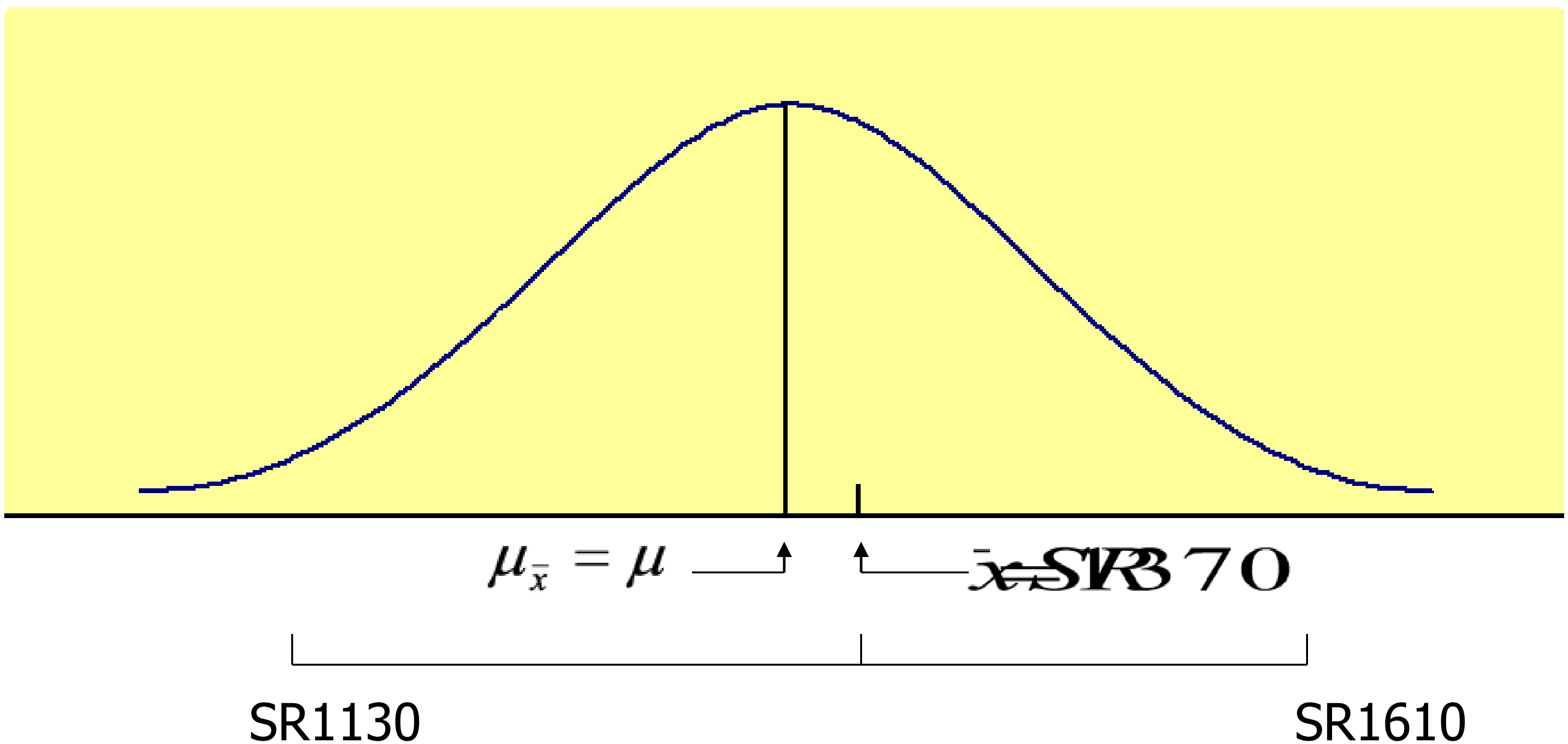
$$\text{Margin of error} = \pm 1.96\,\sigma_{\bar{x}}$$

An Interval Estimation

Definition

In ***interval estimation***, an interval is constructed around the point estimate, and it is stated that this interval is likely to contain the corresponding population parameter.

Interval estimation.



An Interval Estimation cont.

Definition

Each interval is constructed with regard to a given ***confidence level*** and is called a ***confidence interval***. The confidence level associated with a confidence interval states how much confidence we have that this interval contains the true population parameter.

INTERVAL ESTIMATION OF A POPULATION MEAN: LARGE SAMPLES

Confidence Interval for μ for Large Samples

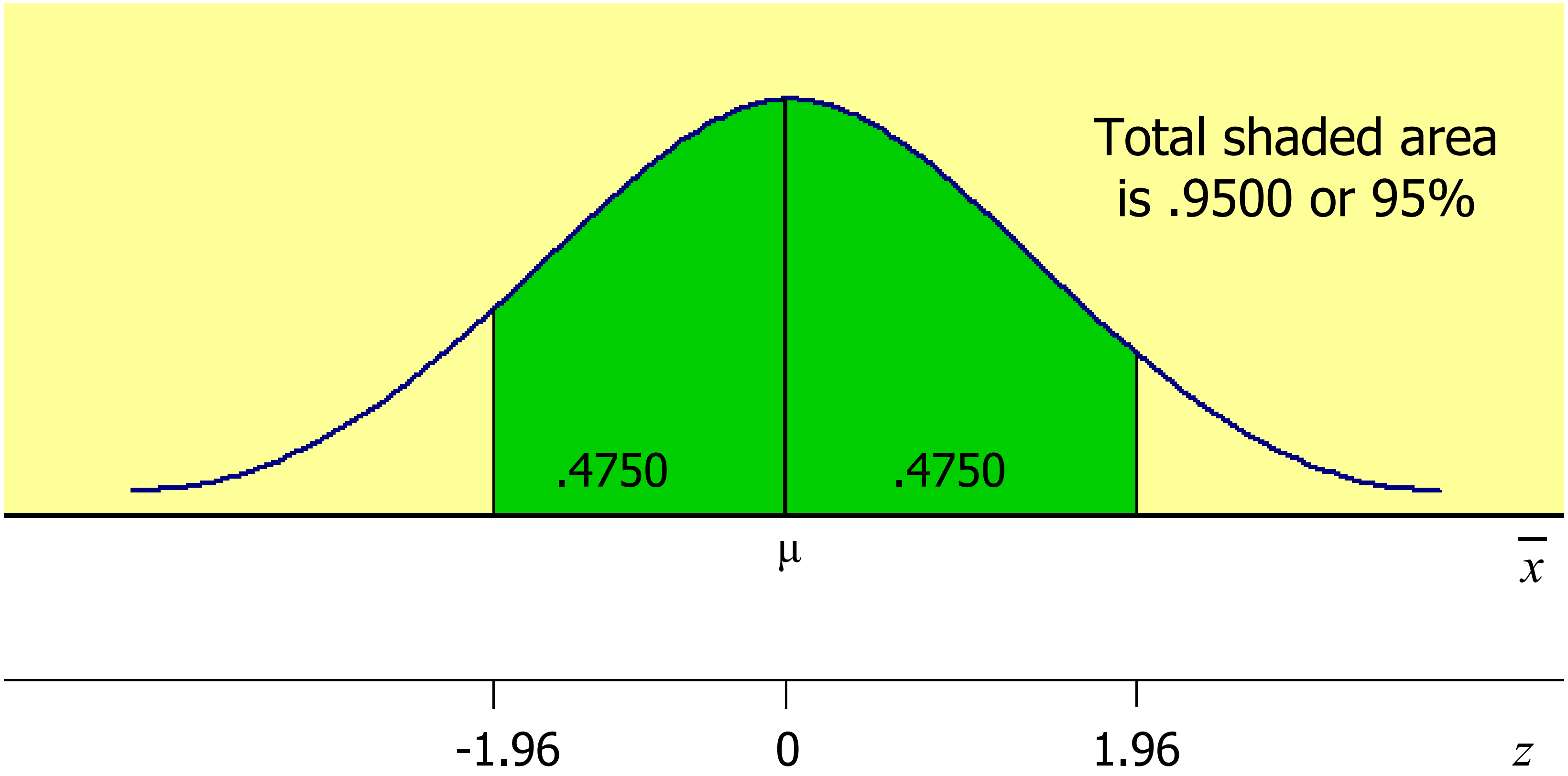
The $(1 - \alpha)100\%$ ***confidence interval for*** μ is

$$\bar{x} \pm z\sigma_{\bar{x}}$$

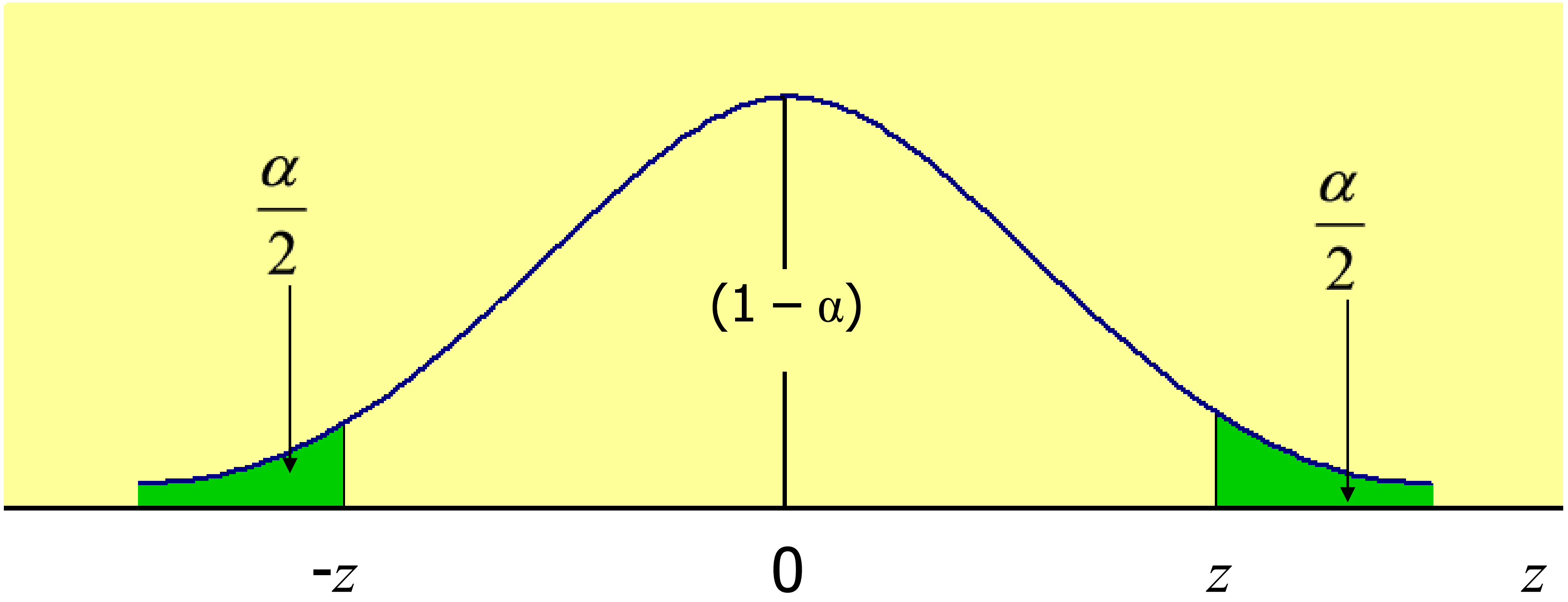
$$\text{where} \qquad \sigma_{\bar{x}} = \sigma / \sqrt{n}$$

The value of z used here is read from the standard normal distribution table for the given confidence level.

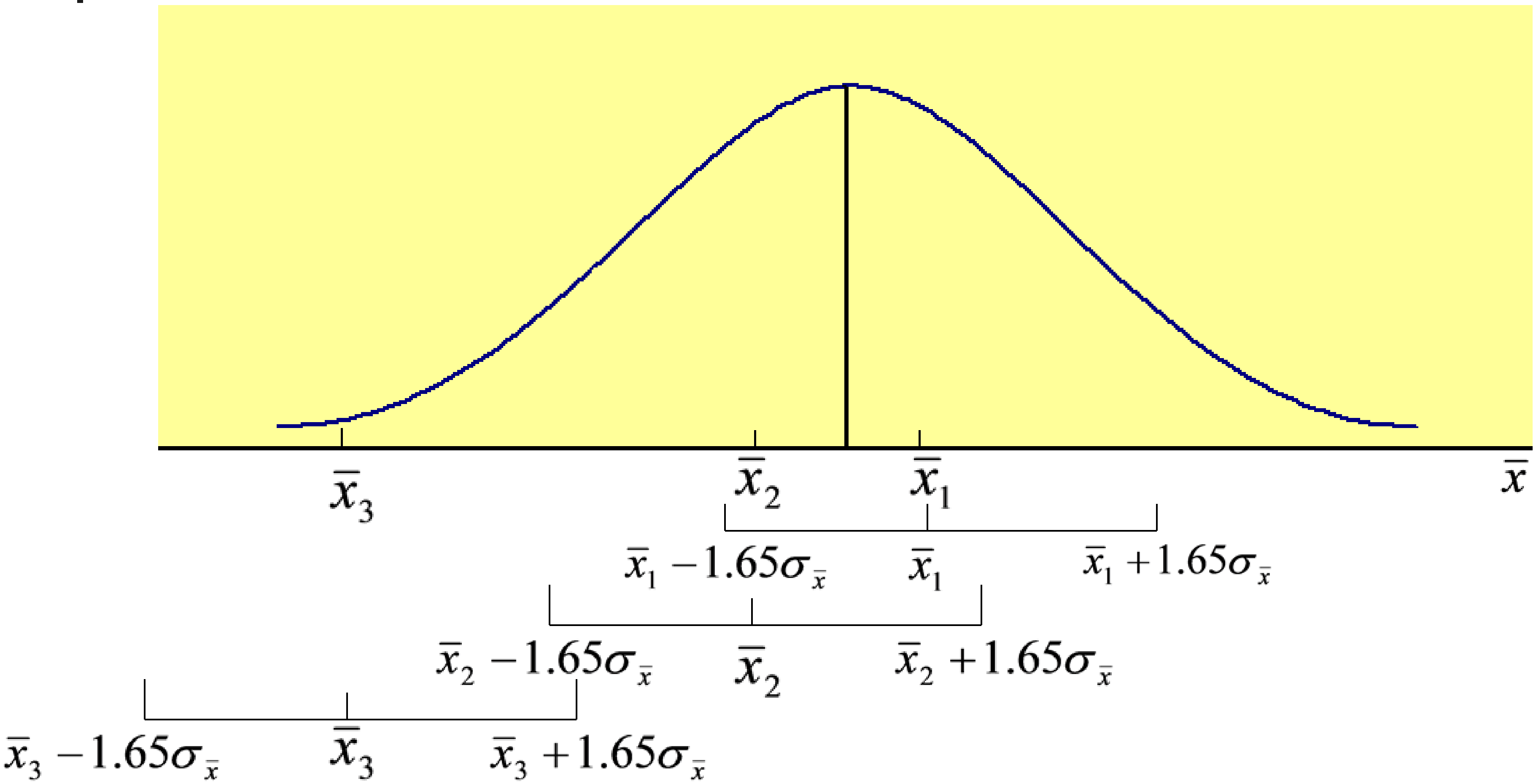
Finding z for a 95% confidence level.



Area in the tails.



Confidence intervals.



Example

A researcher wanted to estimate the mean cholesterol level for all students in KAU. He took a sample of 25 students and found that the mean cholesterol level for this sample is 186 with a standard deviation of 12.

Assume that the cholesterol levels for all students in KAU are (approximately) normally distributed. Construct a 95% confidence interval for the population mean μ.

Solution 8-4

- Confidence level is 95% or .95
- CI= Point estimate ± 1.96(SEM)
- $$SEM = \frac{s}{\sqrt{n}} = \frac{12}{\sqrt{25}} = 2.4$$
- $186 \pm 1.96(2.40)$
- *95% CI (181.3-190.7)*

Solution

$$95\%CI \;\; = 186 \pm 1.96(2.4) = 186 \pm 4.7$$

$$= 181.3 \;\text{ to }\; 190.7$$

- *95% CI (181.3-190.7)*

Thus, we can state with 95% confidence that the mean cholesterol level for all students in KAU lies between 181.3 and 190.7.

Thank You