Simulating Sampling Distributions and Confidence Intervals

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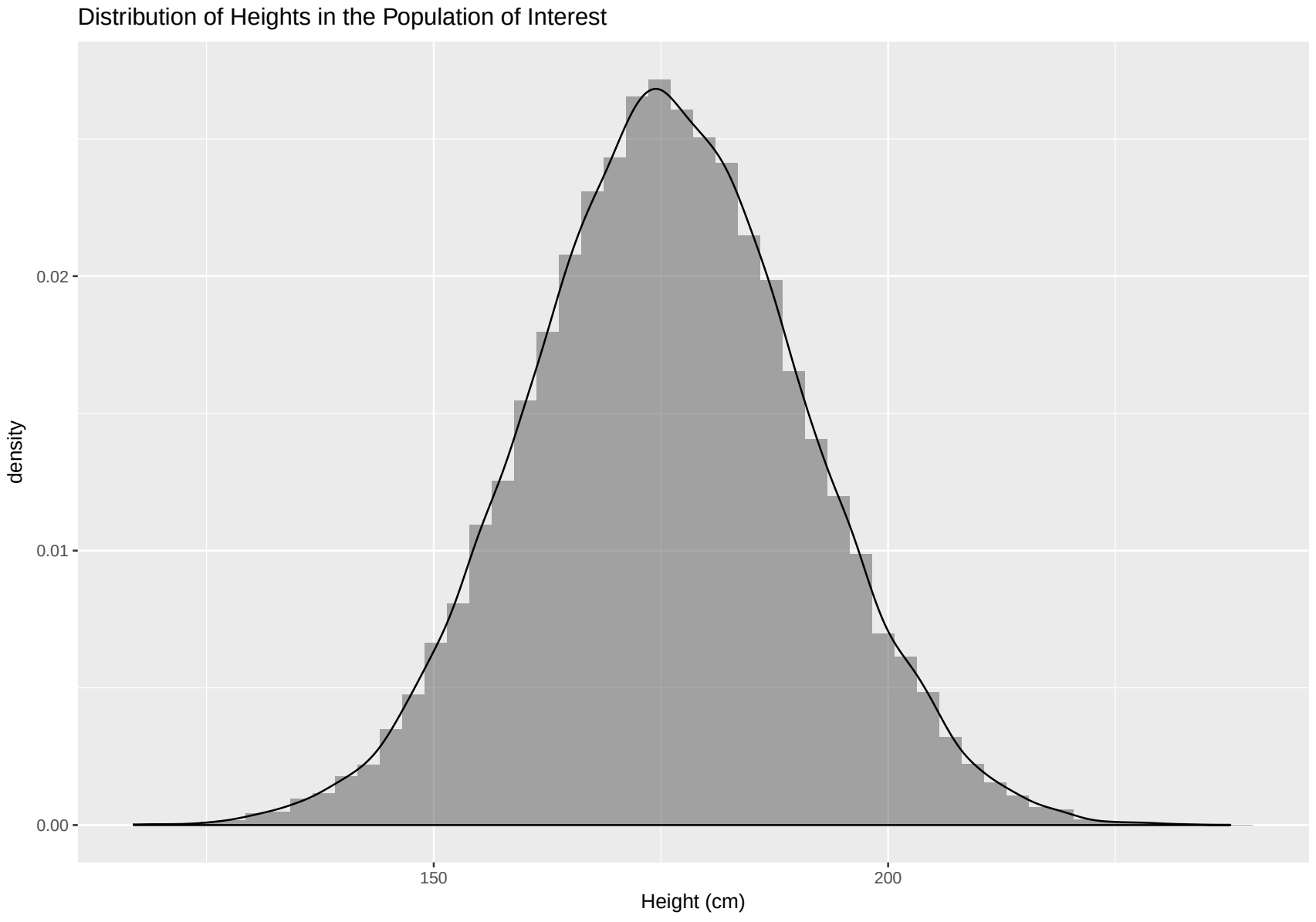
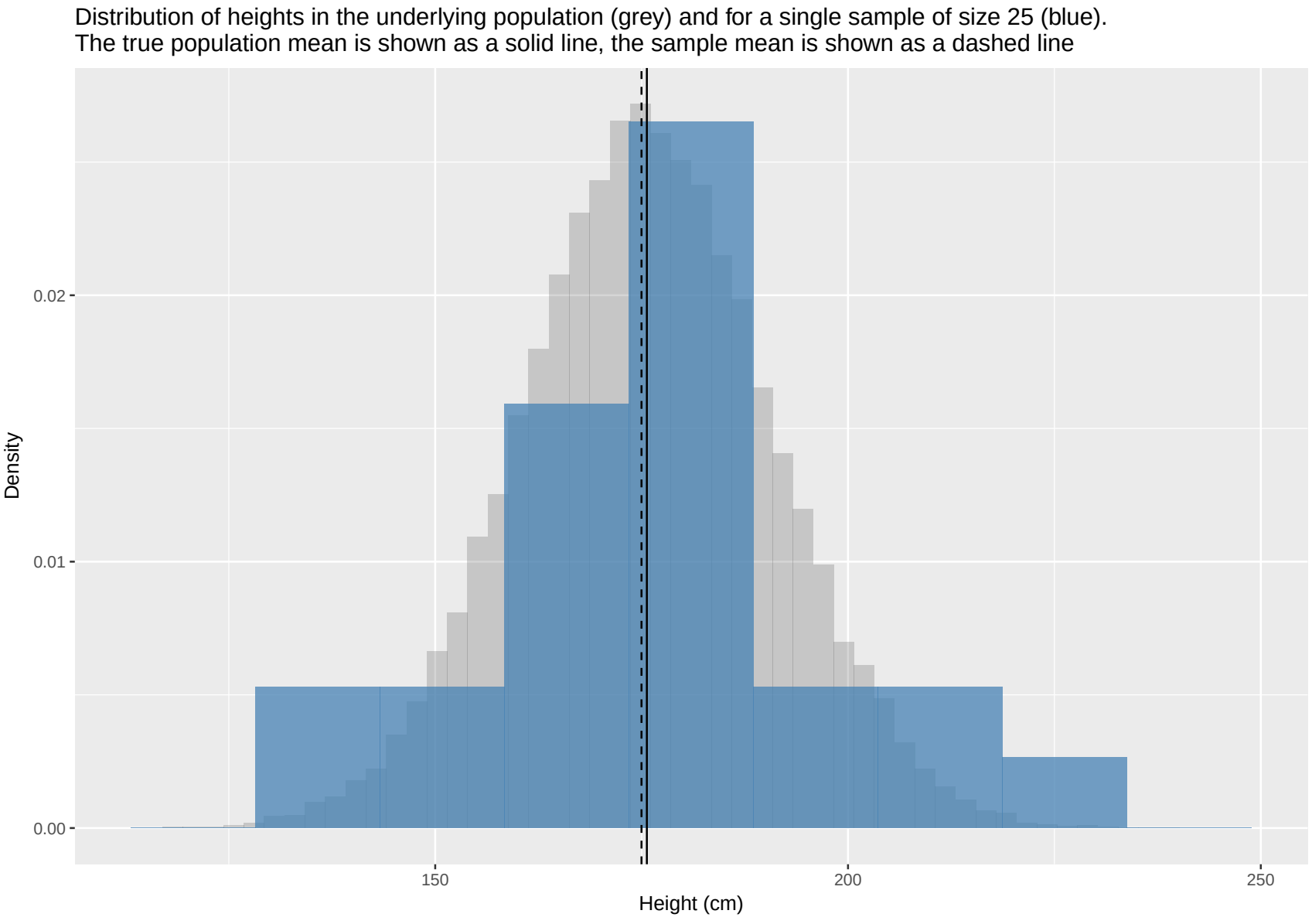
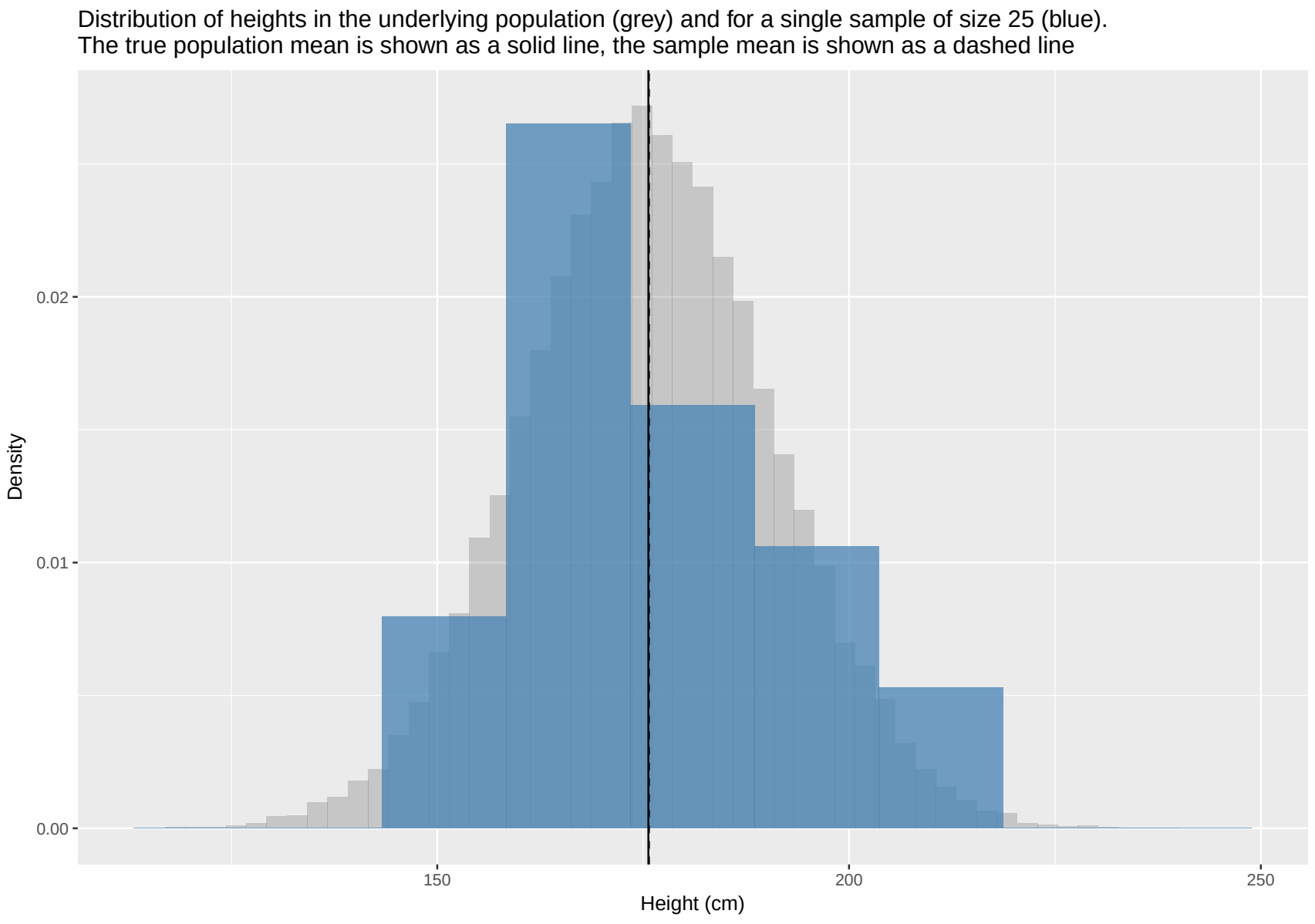
Population of interest



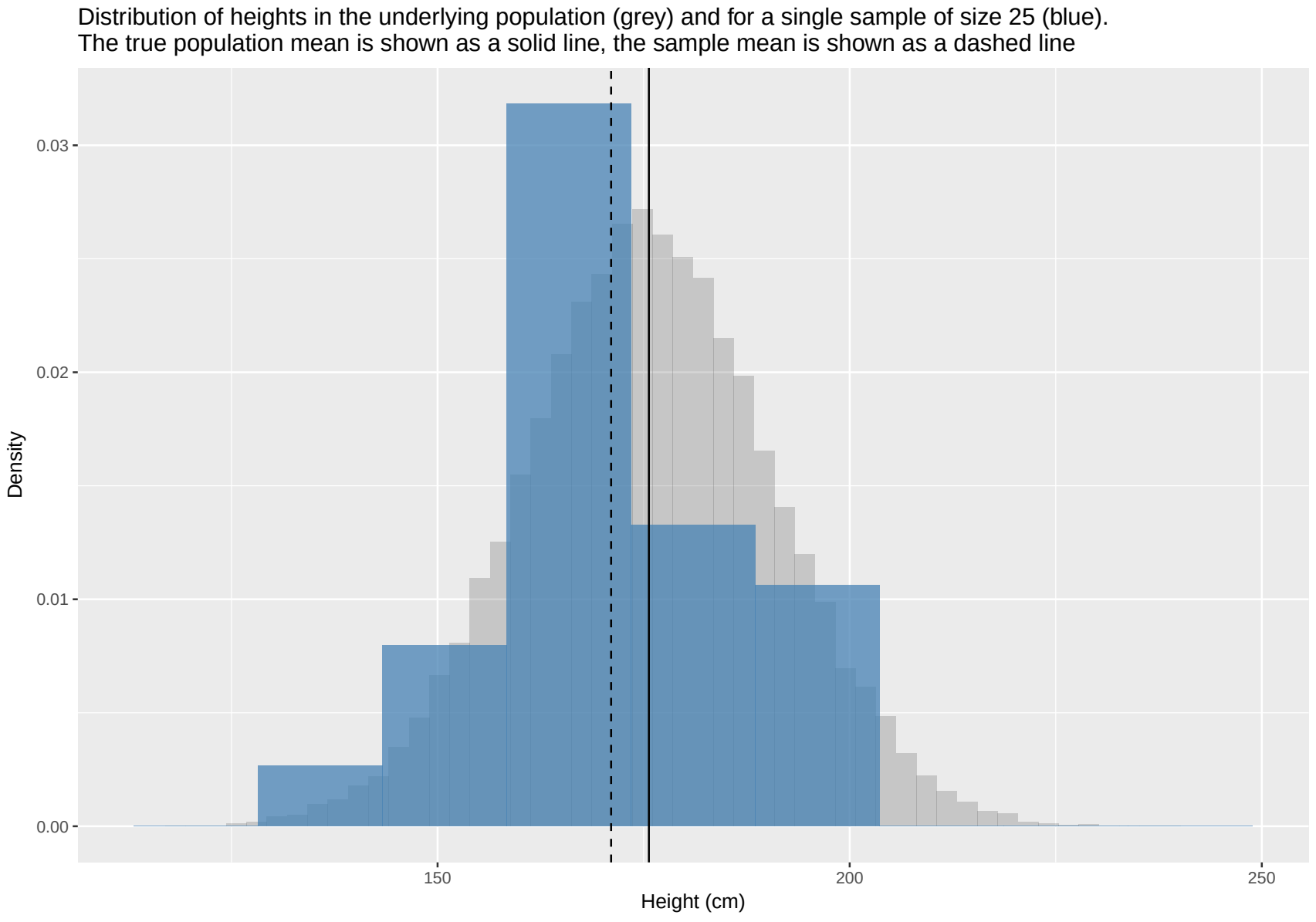
A random sample of size 25



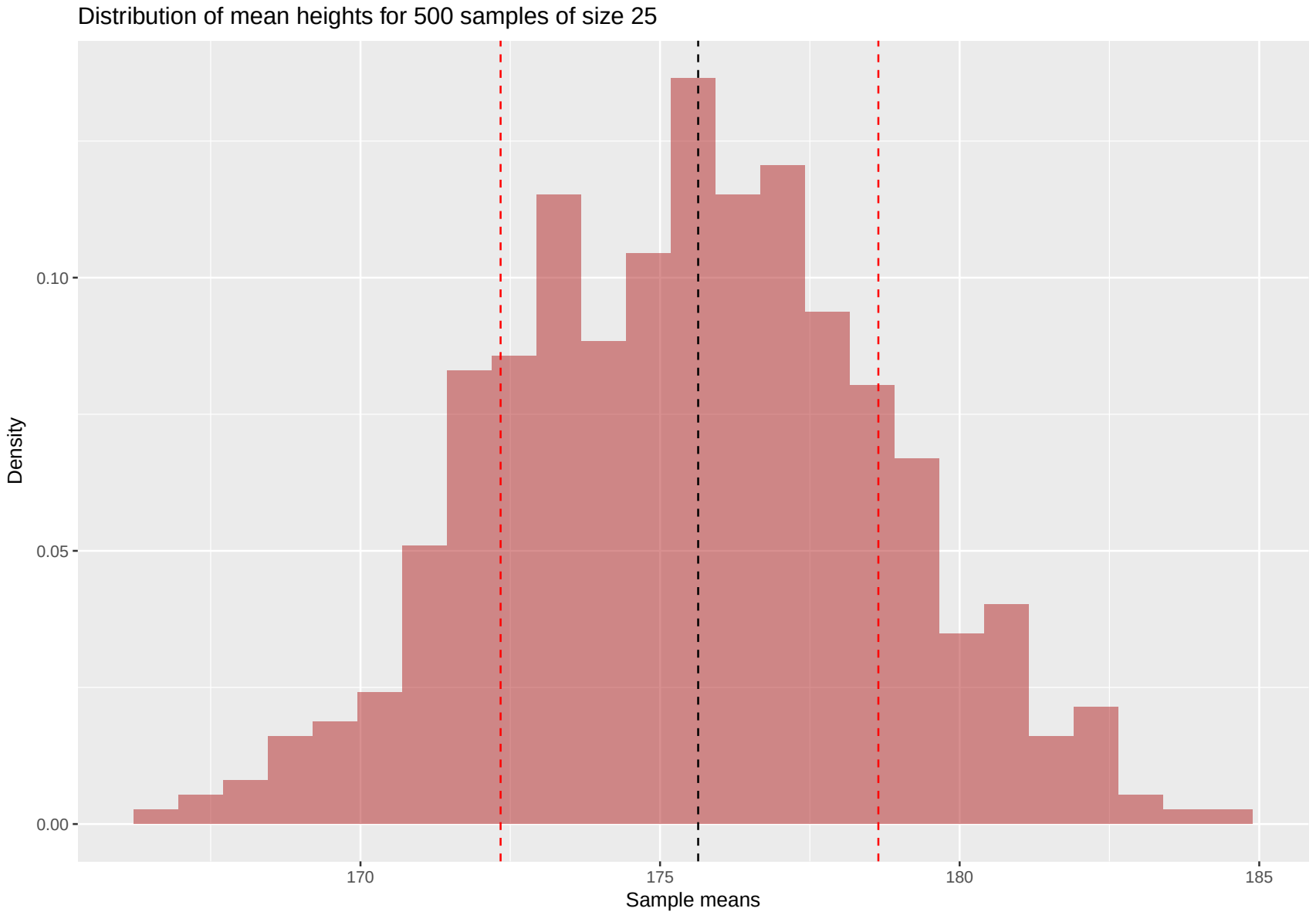
A second random sample of size 25



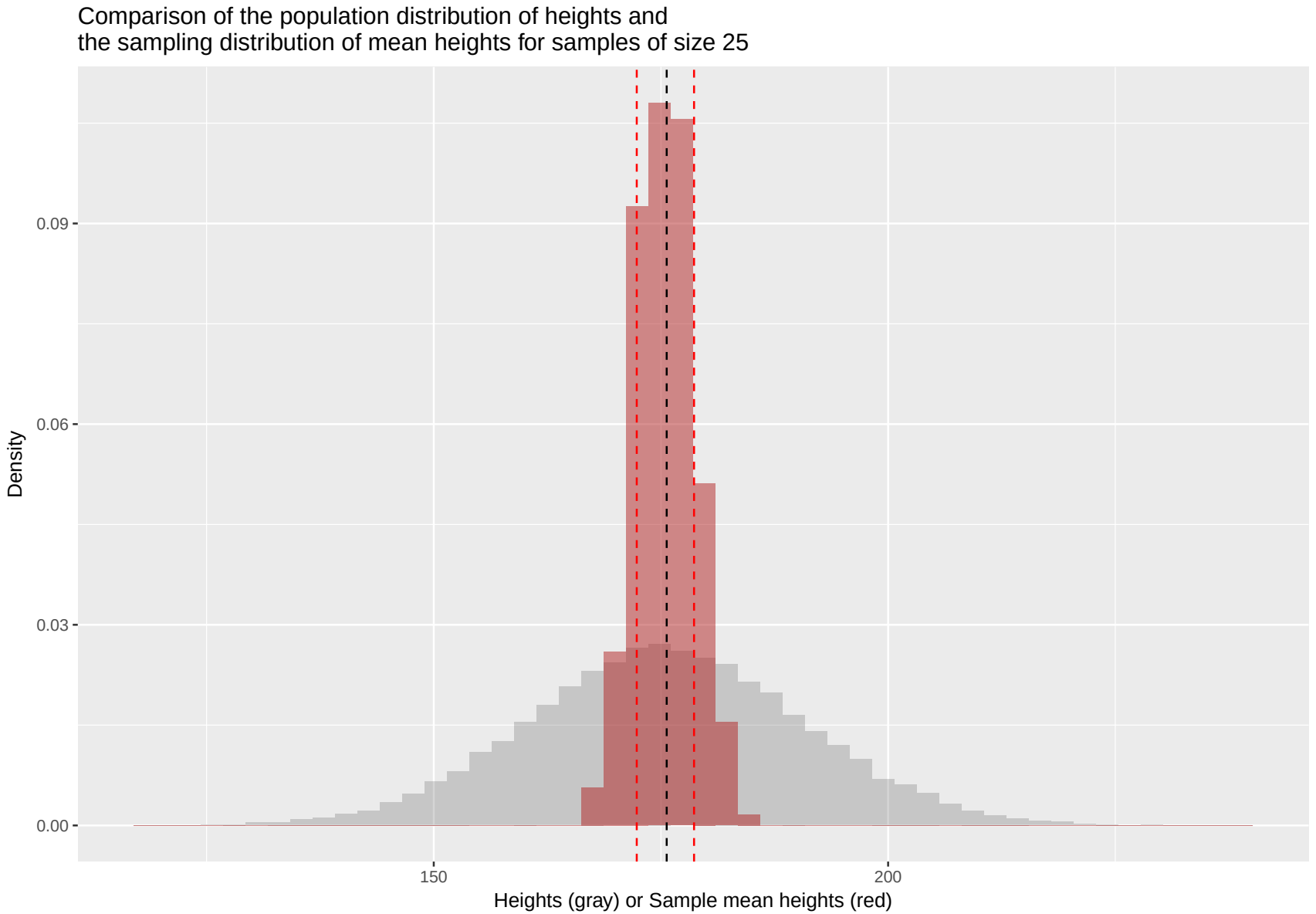
A third random sample of size 25



Sampling distribution of the mean: Distribution of sample means across many random samples



Comparing the population distribution to the sampling distribution of the mean



Sampling Distributions and Standard Errors

Sampling Distributions

The **sampling distribution of a statistic of interest** is the probability distribution of a given statistic for samples of a given size.

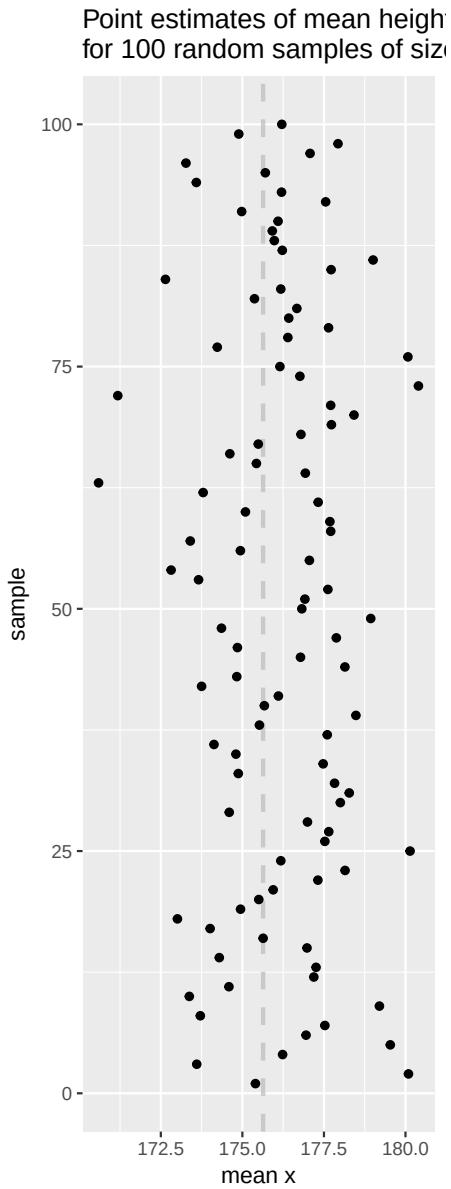
Standard Errors

The **standard error of a statistic of interest** is the standard deviation of the sampling distribution for the given statistic

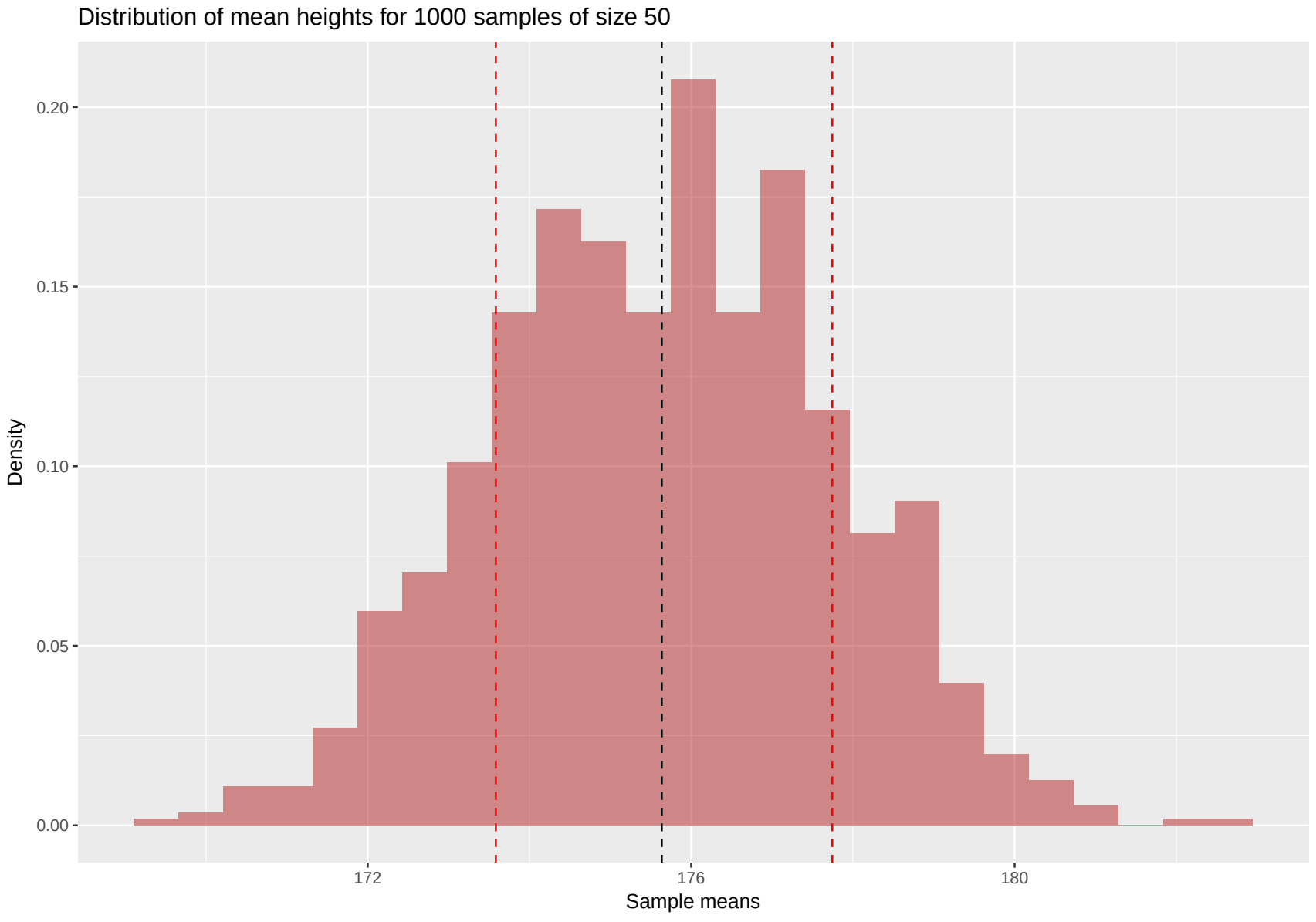
Uncertainty

Together, the sampling distribution and associated standard error for a given statistic are key measures of the uncertainty in statistical estimates

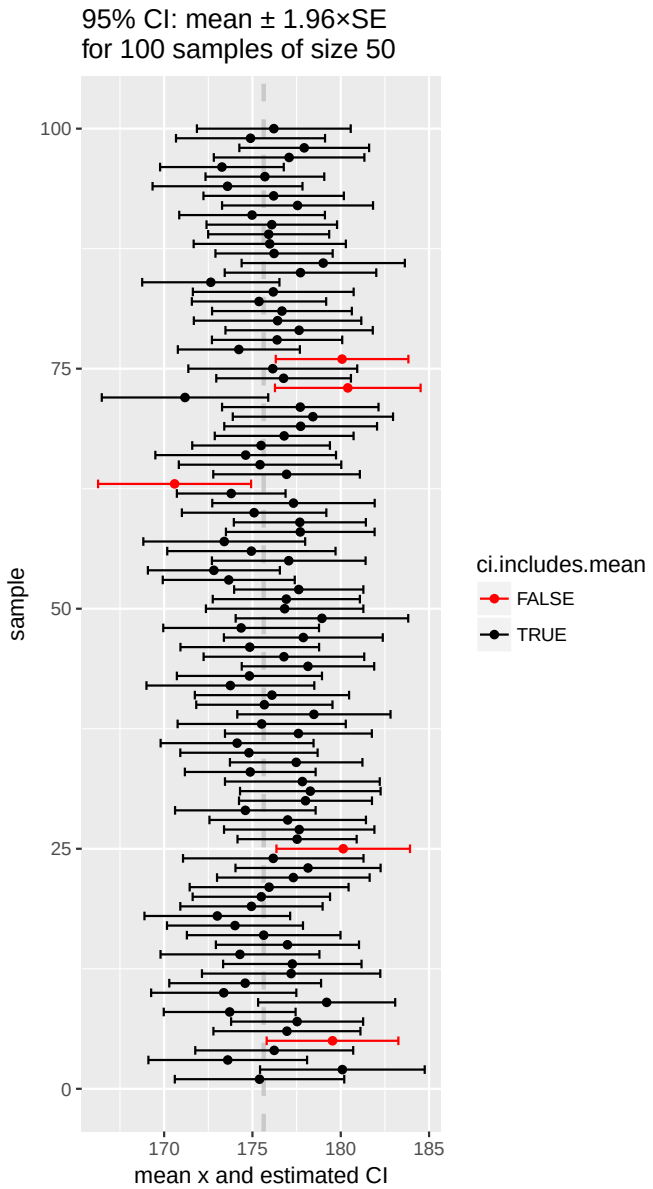
Point estimates of the mean for random samples of size 50



Sampling distribution of the mean



95% Confidence intervals for the mean for random samples of size 50



Interpretting confidence intervals

From NIST page on confidence intervals:

> *As a technical note, a 95 % confidence interval does not mean that there is a 95 % probability that the interval contains the true mean. The interval computed from a given sample either contains the true mean or it does not. Instead,* ***the level of confidence is associated with the method of calculating the interval*** *. . . That is, for a 95% confidence interval, if many samples are collected and the confidence interval computed, in the long run about 95% of these intervals would contain the true mean.*