Welcome to the course!

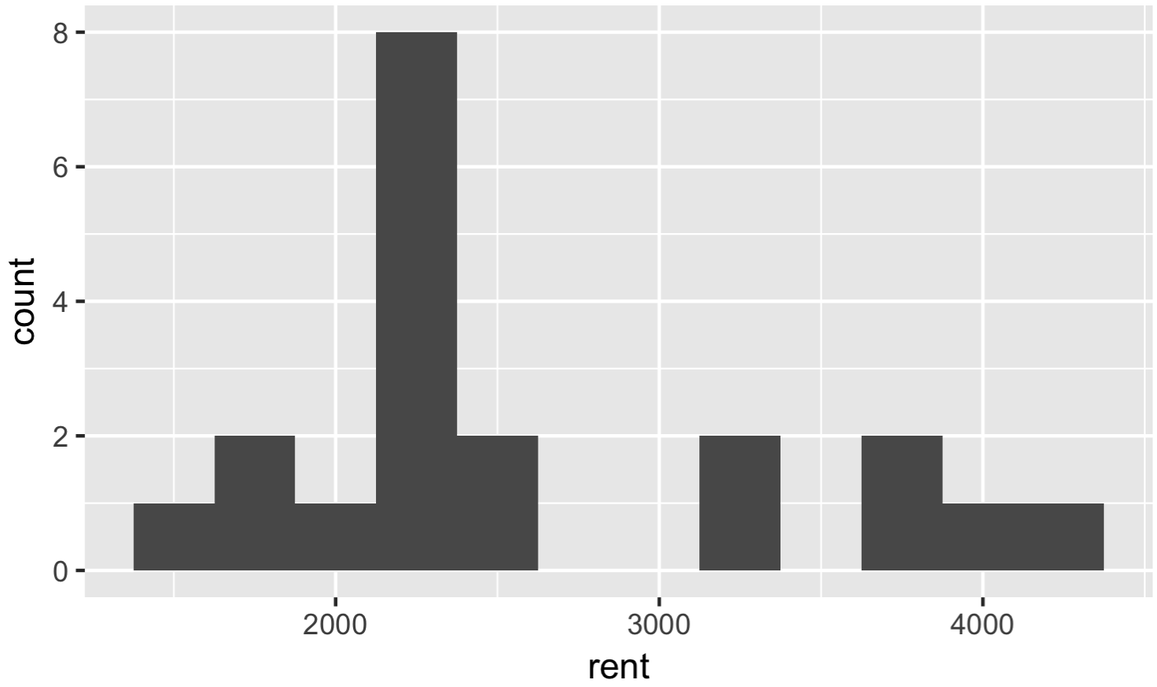
INFERENCE FOR NUMERICAL DATA IN R

Mine Cetinkaya-Rundel
Associate Professor of the Practice,
Duke University

Rent in Manhattan

On a given day, twenty 1 BR apartments were randomly selected on Craigslist Manhattan from apartments listed as "by owner" (as opposed to by a rental agency).

Is the mean or the median a better measure of typical rent in Manhattan?



Bootstrapping techniques

- Assume the data is representative
- Pulling oneself up by one's bootstraps

Observed sample

sample median = $2,350

Bootstrap population

Bootstrapping scheme

1. Take a bootstrap sample - a random sample taken with replacement from the original sample, of the same size as the original sample.
2. Calculate the bootstrap statistic - a statistic such as mean, median, proportion, etc. computed on the bootstrap samples.
3. Repeat steps (1) and (2) many times to create a bootstrap distribution - a distribution of bootstrap statistics.

Bootstrapping scheme, in R

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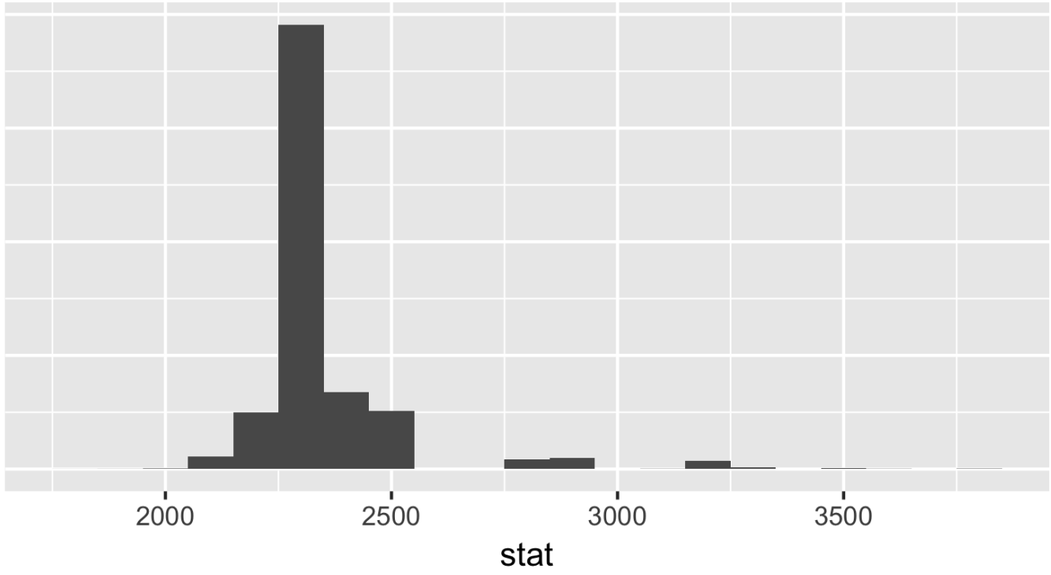

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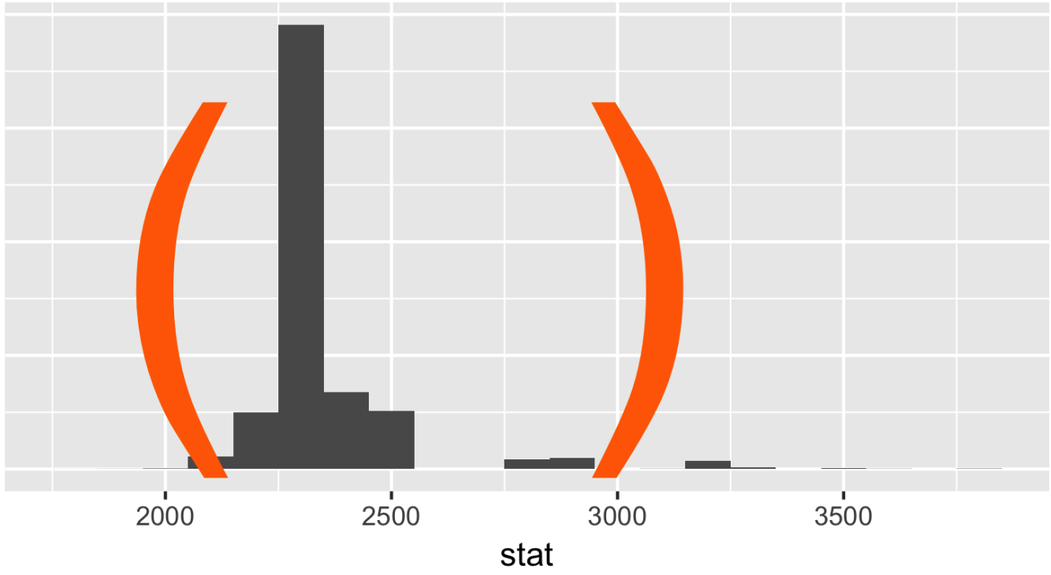

Let's practice!

INFERENCE FOR NUMERICAL DATA IN R

Review: Percentile and standard error methods

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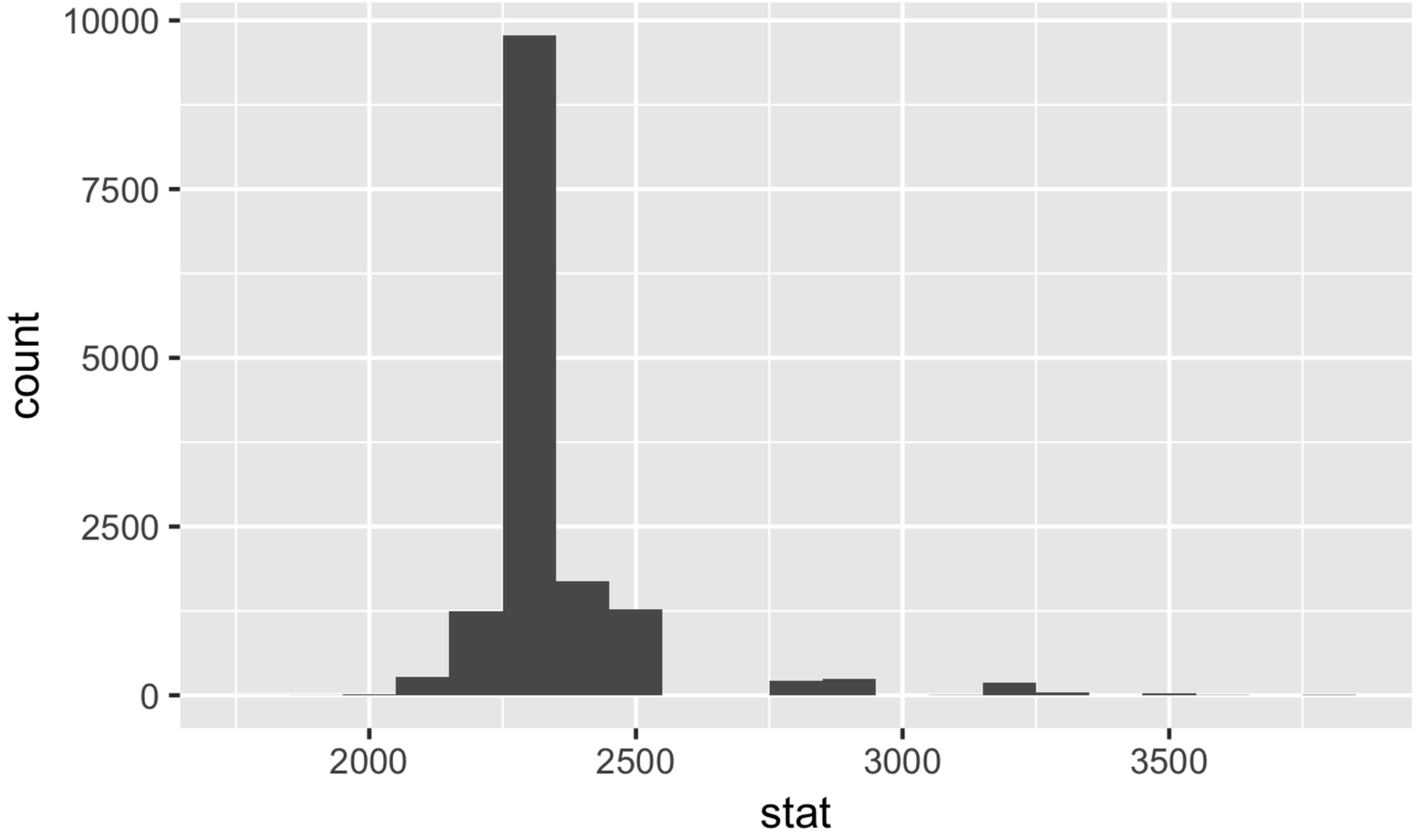
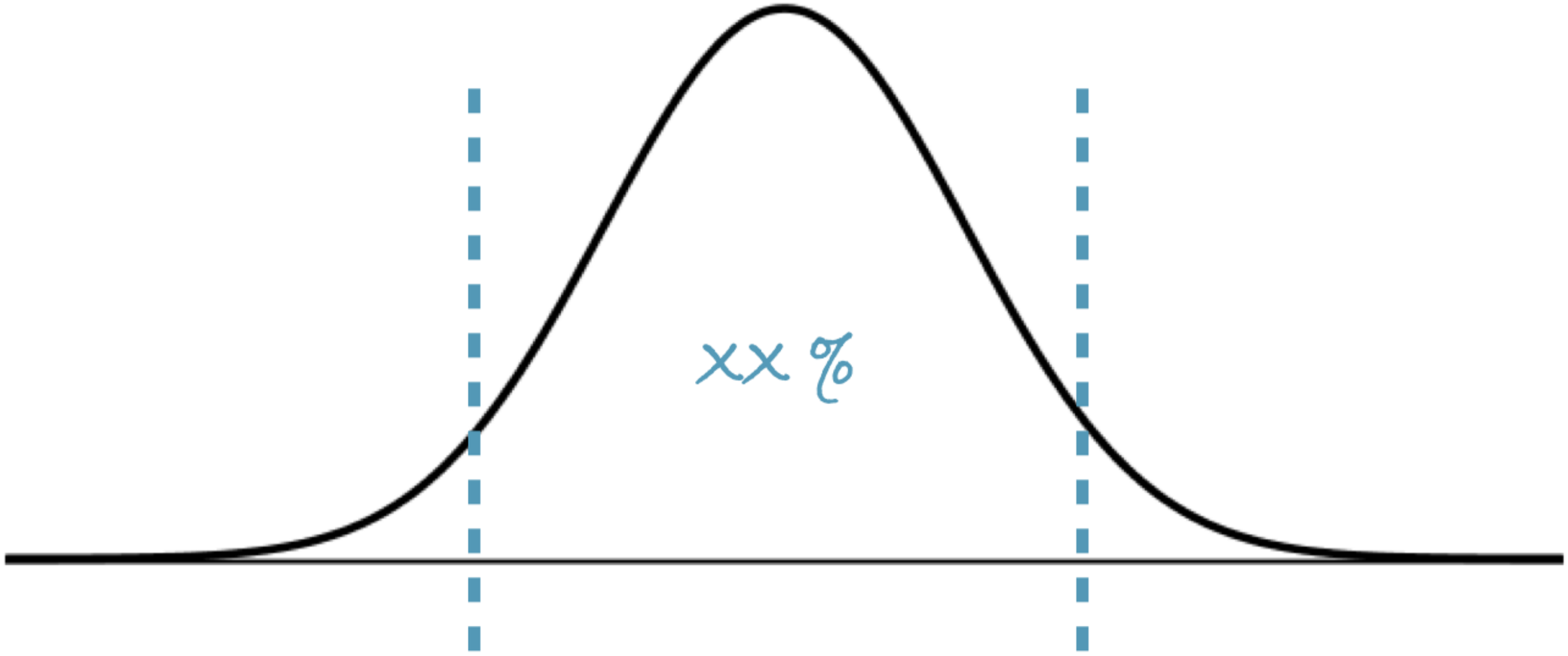
Bootstrap distribution



Percentile method



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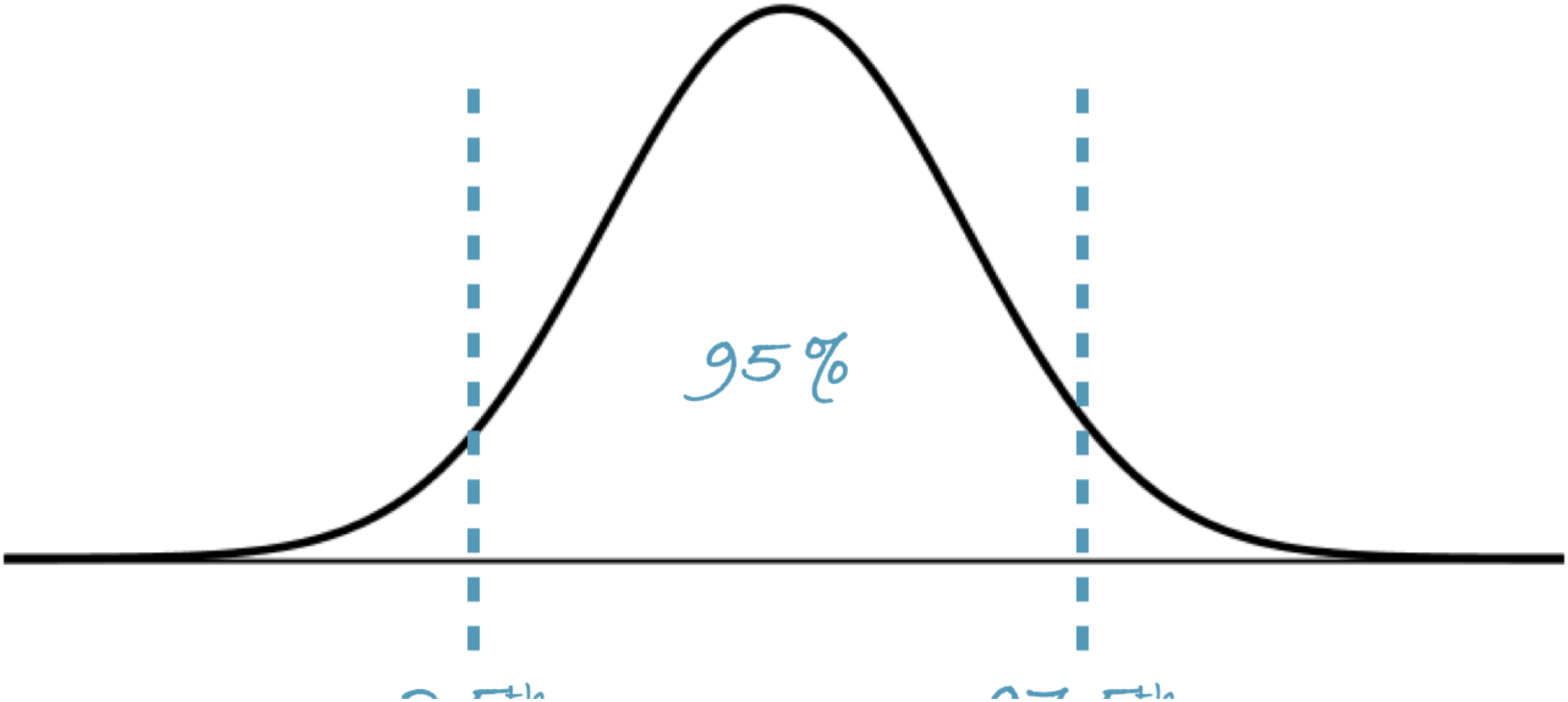

Standard error method

sample statistic $\pm\ t^*_{df=n-1} \times SE_{boot}$

- df for t^* is $n - 1$, where n is the sample size
- SE_{boot} is the standard deviation of the bootstrap distribution distribution

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Re-centering a bootstrap distribution for hypothesis testing

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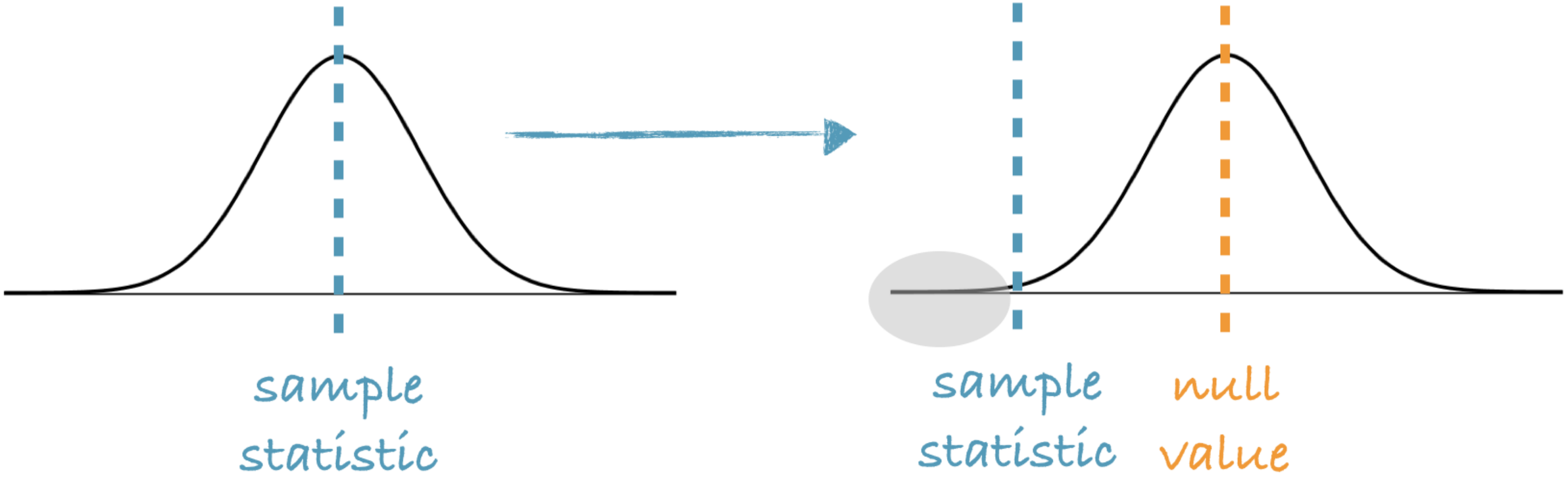
datacamp

Re-centering a bootstrap distribution for hypothesis testing

- Bootstrap distributions are by design centered at the observed sample statistic.
- However since in a hypothesis test we assume that H_0 is true, we shift the bootstrap distribution to be centered at the null value.
- p-value = The proportion of simulations that yield a sample statistic at least as favorable to the alternative hypothesis as the observed sample statistic.

Re-centering the bootstrap distribution - sketch



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