Typical study

Hypothesis: What you predict.

Null hypothesis: Assuming your prediction is not true.

Data: A single sample. Maybe more.

Test statistic:

Question

- Assuming the null hypothesis, how unusual is the test statistic?

- **Statistical question**: Assuming the null hypothesis, what is the probability of obtaining the sample mean, or higher?

Typical study

Hypothesis: What you predict.

Null hypothesis: Assuming your prediction is not true.

Data: A single sample. Maybe more.

Test statistic:

Question

- Assuming the null hypothesis, how unusual is the test statistic?

- **p-value**: Assuming the null hypothesis, what is the probability of obtaining the sample mean, or higher?

Typical study

Hypothesis:

Null hypothesis:

Data:

Test statistic:

Question

- Assuming the null hypothesis, how unusual is the _____?

- **p-value**: Assuming the null hypothesis, what is the probability of obtaining the _____, or higher?

Typical study

Hypothesis: Extra time improves mean test score.

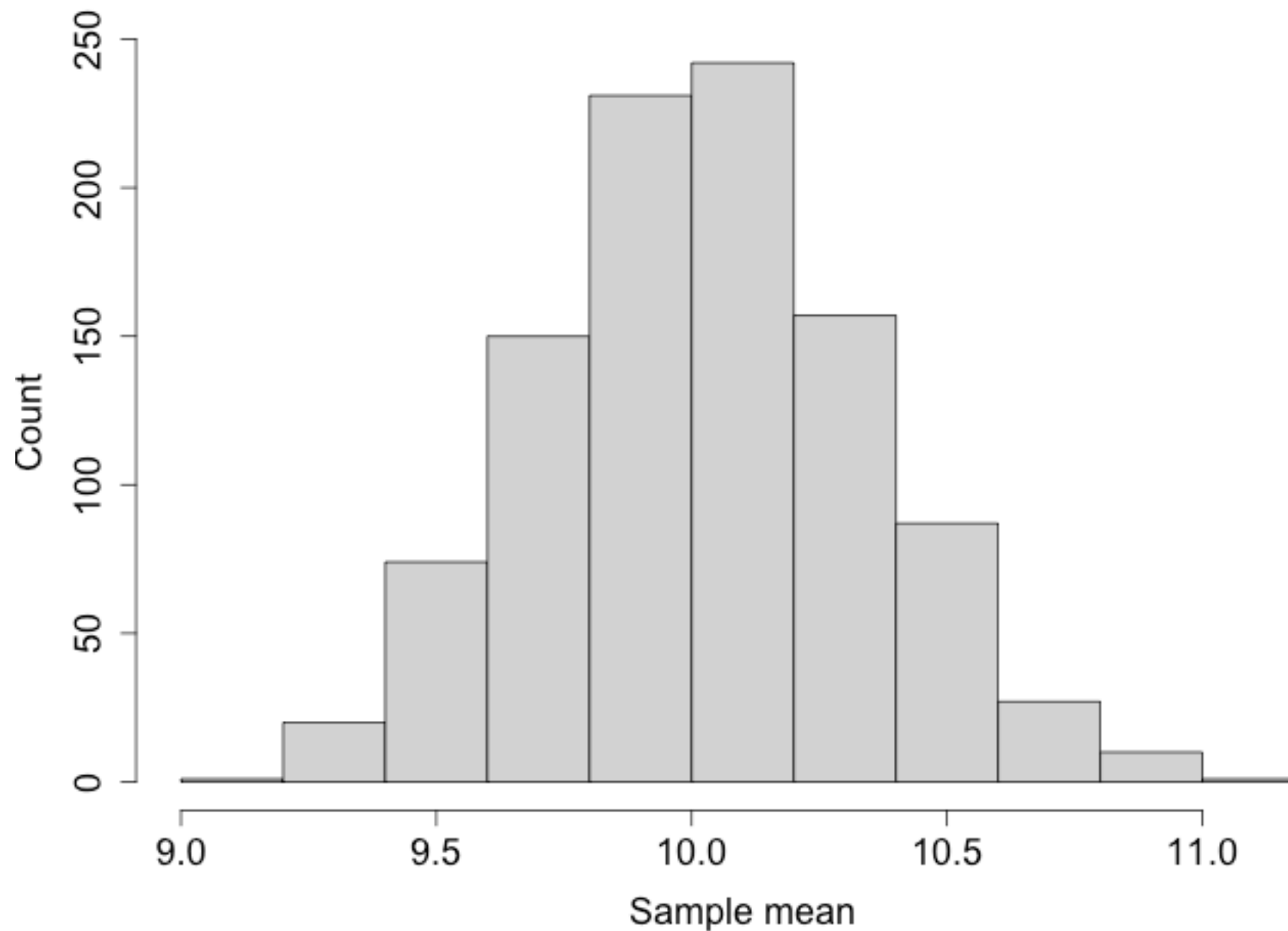**Null hypothesis**: Scores are the same as before.

Data: A single sample of 1000 students

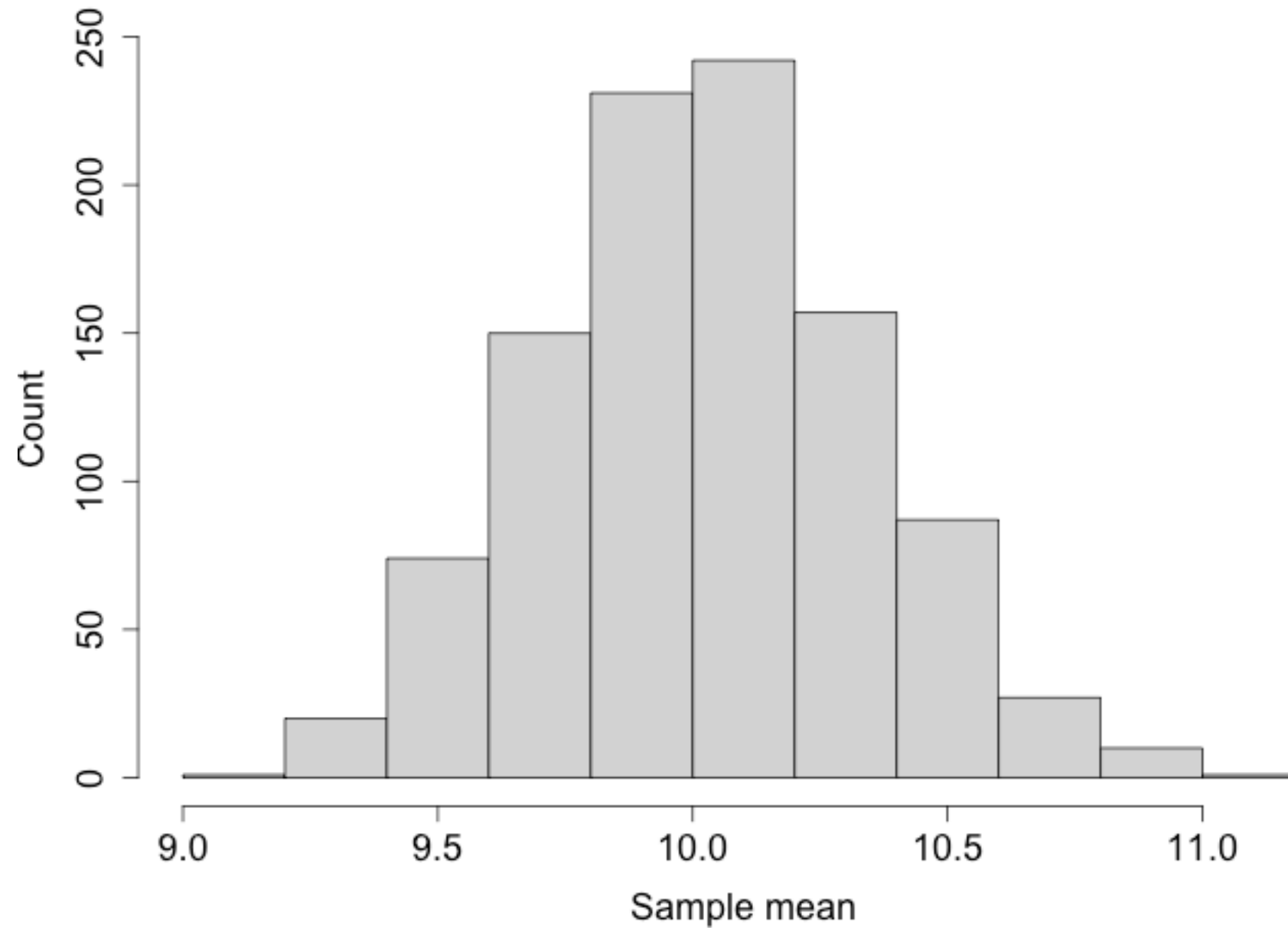**Test statistic**: Sample mean

Question

- Assuming the null hypothesis, how unusual is the <u>sample mean</u>?

- **p-value**: Assuming the null hypothesis, what is the probability of obtaining the <u>sample mean</u> or higher?
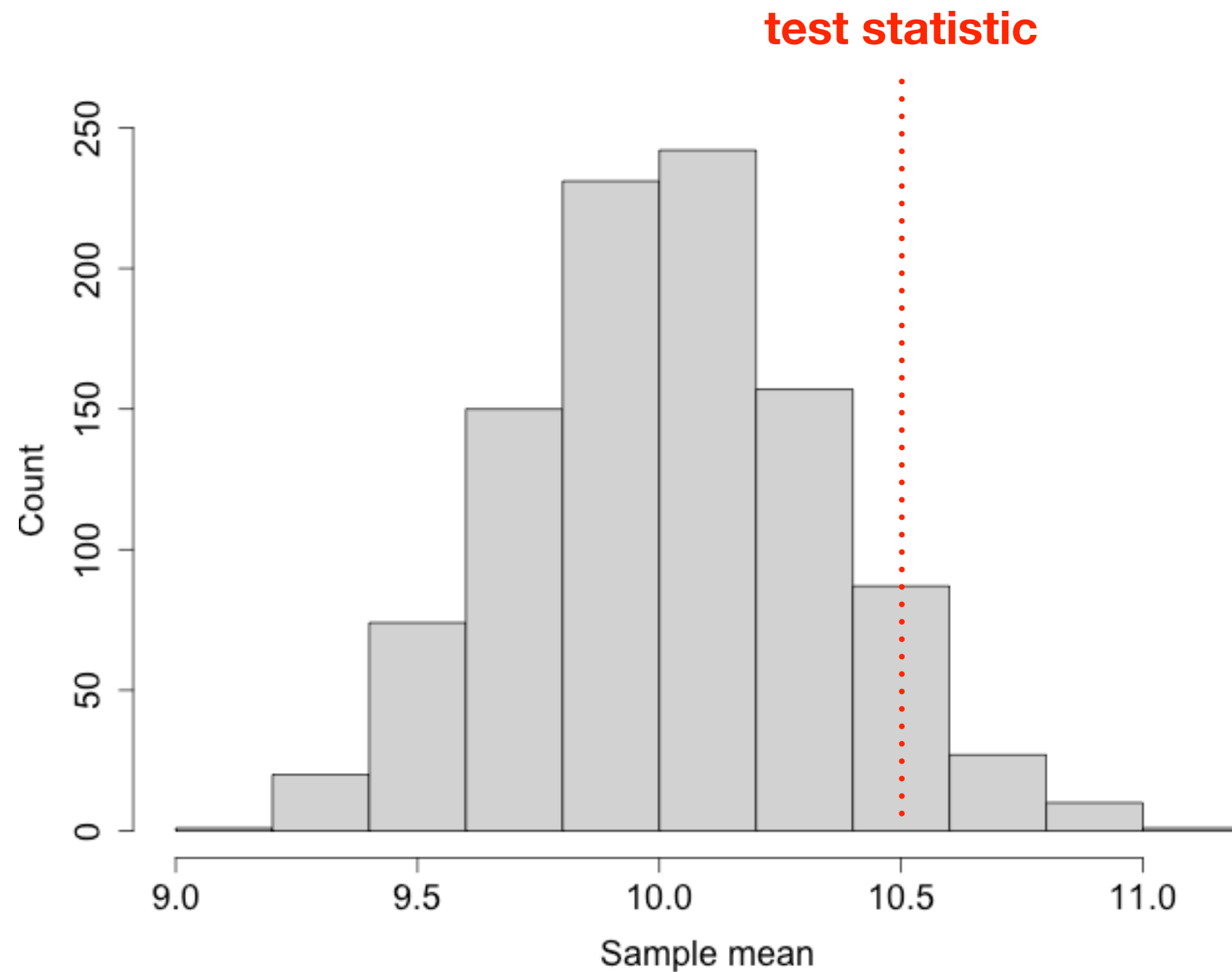
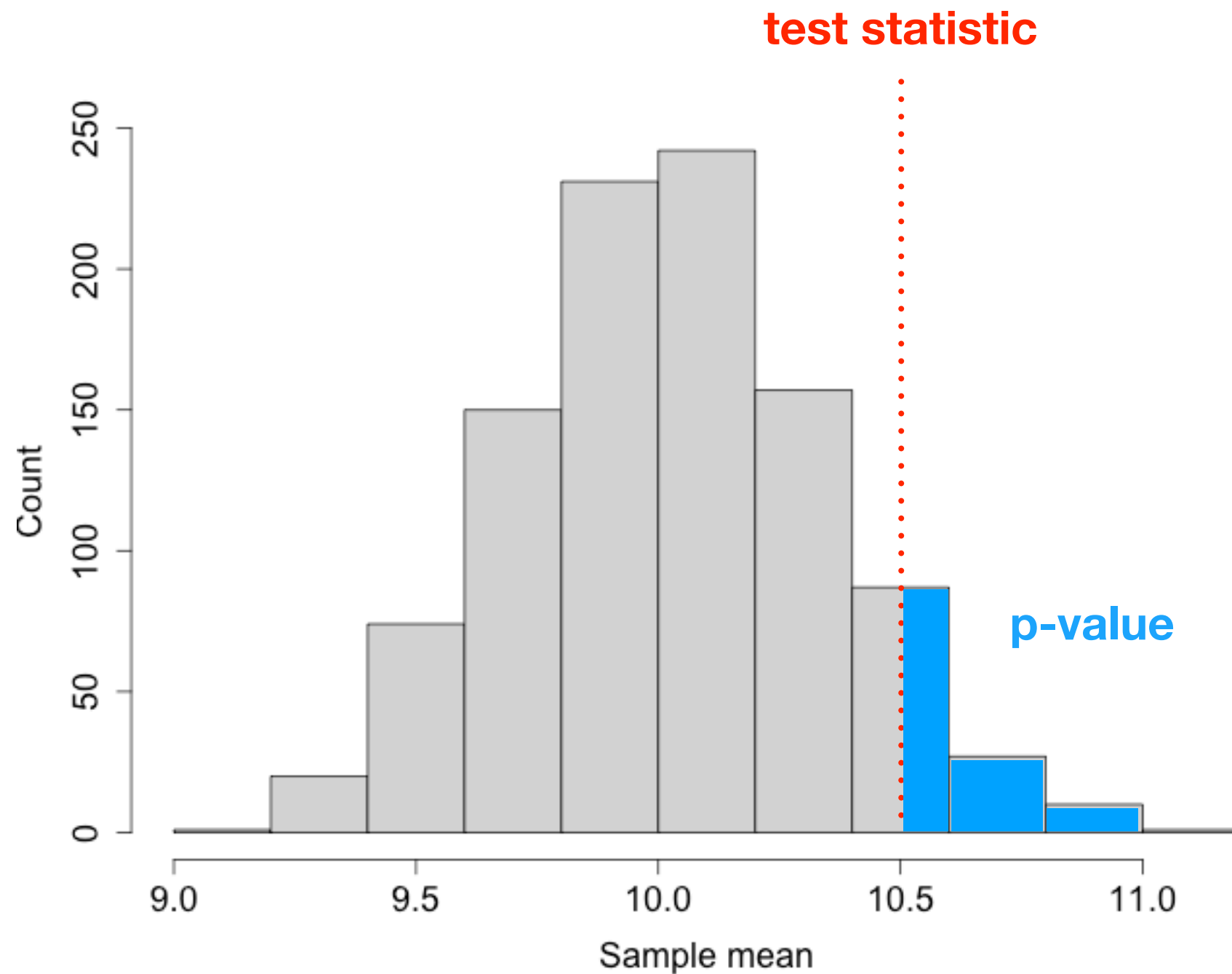# Sampling distribution assuming no change

Null distribution

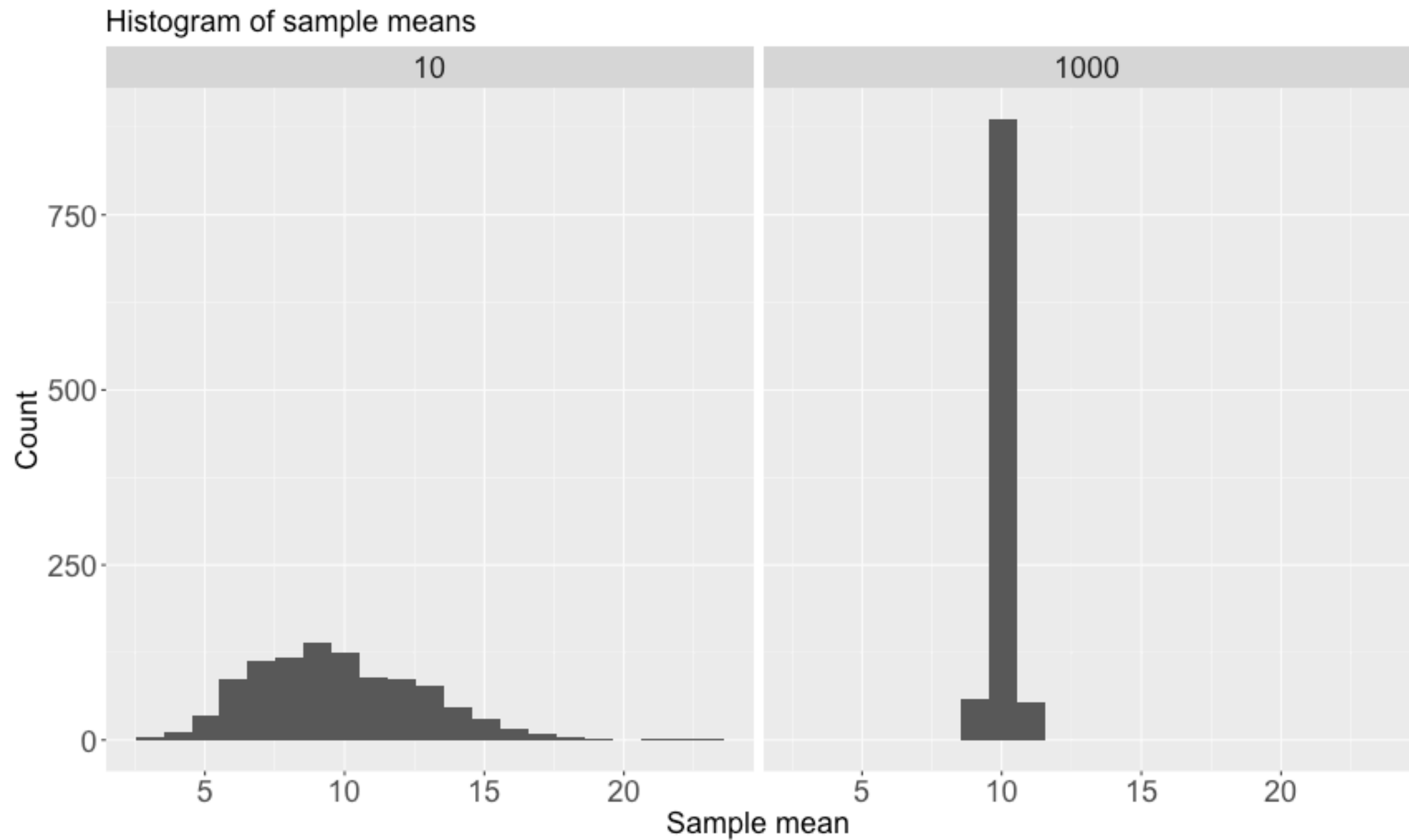# Null distribution

Null distribution

Question

What would happen to the p-value we measured if we used a sample size of 100 instead of 1000?

We still obtained a sample mean of 10.5

Would the p-value:

    A. decrease

    B. stay the same

    C. increase

Question (hint)

Histogram of sample means

Now what?

In statistical terms

- If the p-value is very low, then we reject the null hypothesis.

- Perhaps the hypothesis is true …

How low does the p-value need to be?

- Typically less than 0.05

- If that seems arbitrary, that's because it is.

What do you report?

We haven't gotten there yet.

This example is to show you what a p-value means.

We would actually perform a one-sample t-test and report something like this:

- *Students given extra time scored higher (M = 10.5, SD = ___) than found normally, t(___) = ___, p = ___.*

What p-value do we write here?

But we never have the null distribution