p-value

A generic statistic for hypothesis testing

Prof Hans Georg Schaathun

Høgskolen i Ålesund

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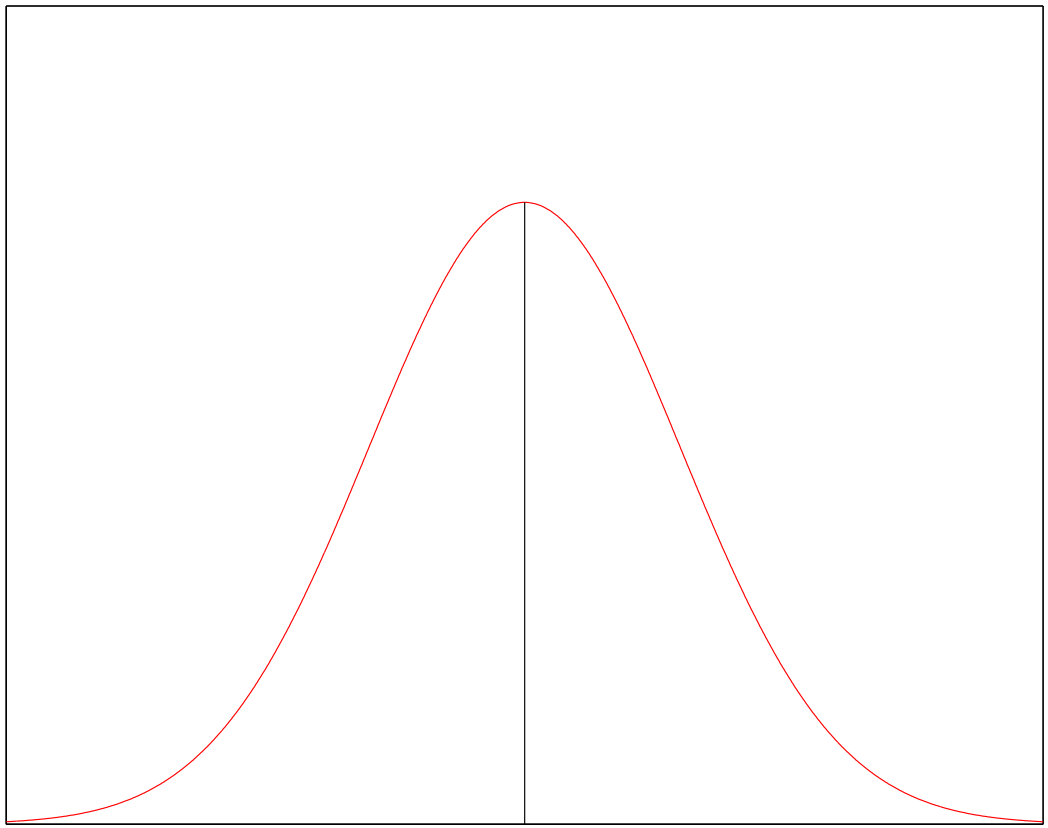
Hypothesis Testing



The one-sided the *p*-value

$$H_0 : \theta = \theta_0 \tag{1}$$
$$H_1 : \theta > \theta_0 \tag{2}$$

- Observation t of the statistic T
- Define the p-value
  - $p = P(T > t)$

The two-sided the *p*-value

$$H_0 : \theta = \theta_0 \tag{3}$$
$$H_1 : \theta \neq \theta_0 \tag{4}$$

- Observation t of the statistic T
- Define the p-value
  - $p = 2 \cdot P(T > t)$

Using the *p*-value

- Level of Significance α
- Using the *p*-value is trivial
- Compare the *p*-value to the level of significance
  1. $p \leq \alpha \Rightarrow$ Reject H_0
  2. $p > \alpha \Rightarrow$ Do not reject H_0

HØGSKOLEN I ÅLESUND
Aalesund University College

Summary

- The *p*-value is a generic test statistic
- The *p*-value is the probability
  - of observing a result *more extreme*
  - than the actual observation
- Test compares *p* to α
  1. $p \leq \alpha \Rightarrow$ Reject H_0
  2. $p > \alpha \Rightarrow$ Do not reject H_0

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