

ISyE 6739 Video Assignment 14

1. Define what is type I and type II errors.

Answer:

Rejecting the null hypothesis H_0 when it is true is defined as a type I error.

Failing to reject the null hypothesis H_0 when it is false is defined as a type II error.

2. What is the power of the test? How can we derive the power of the test (mean of a normal distribution, known variance, two-sided)?

Answer:

The power of the test is a probability to reject the null hypothesis when it is false; the power of the test is equal $(1 - \beta)$.

$$1 - \beta = 1 - \Phi\left(Z_{\alpha/2} - \frac{\delta\sqrt{n}}{\sigma}\right) + \Phi\left(-Z_{\alpha/2} - \frac{\delta\sqrt{n}}{\sigma}\right),$$

where $\delta = |\mu_0 - \mu_1|$.

3. For a given significance level α , what sample size n should be used if we want the power of one-sided hypothesis test to be β_0 (mean of a normal distribution, known variance)?

Answer:

$$n = \frac{(Z_{\alpha} + Z_{\beta})^2 \sigma^2}{(\mu_0 - \mu_1)^2}.$$