ST2131 Mathematical Statistics

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1 Chapter 4 Parameter Estimation

1.1 Standard Error

SE = SD(sample mean)

2 Chapter 6 Hypothesis Testing

2.1 The Neymann-Pearson Paradigm

Definition 2.1 (Statistical Hypothesis) *Statistical hypothesis is an assertion/conjecture about the distribution of one or more random RVs.*

Simple hypothesis: a SH that completely specifies the distribution
Complex hypothesis: otherwise

Definition 2.2 (Null Alternative Hypotheses) *When deciding which of two hypothesis is true, the **first** is called the null hypothesis H_0, and the **other**, alternative hypothesis H_A or H_1*

The decision rule is based on a test statistic.

Definition 2.3 (Type I Type II errors) *The decision rule has typically 2 possible conclusions: **reject, or do not reject** H_0.*

Type I error: *rejecting H_0 when it is true. The probability of this is called significance level of the test, α.*

Type II error: ***accepting*** *(do not reject) H_0 when it is false. Probability of this is β. Power of the test is probability of* ***rejecting*** *H_0 when it is false, $1 - \beta$.*

Example 2.1 (Egg Tarts - Normal) *Egg tarts weigh, in grams $N(40, 2^2)$ when made by chefs, but $N(43, 2^2)$ when made by a trainee. Given the weight of tarts, is the trainee working today?*