

STAT 269 – Winter 2009

Homework Assignment 5

Assignment 5 — due Friday, February 13 (in the class or in the mail-box for office 511 during the day)

Problem numbers refer to Freund's textbook.

1. **Problem 13.20**
2. **Problems 13.22, 13.24**
3. **Problems 13.27, 13.28**
4. **Problem 13.48**
5. **Problem 13.66**
6. **(optional)** Suppose you are given a random sample x_1, \dots, x_n from a normal distribution $\mathcal{N}(\mu, \sigma^2)$, with a given variance σ^2 . The goal is to test the simple null hypothesis

$$H_0 : \mu = 0,$$

against the one sided alternative

$$H_1 : \mu < 0.$$

- a) Describe a test for the above problem, at a given significance level α .
- b) For the test you proposed in Part a), find the probability $\beta(\mu)$ of the **type II error**, for a given alternative value $\mu < 0$.
- c) Find $\lim_{\mu \rightarrow -\infty} \beta(\mu)$. Interpret your result.
- d) Find $\lim_{\mu \rightarrow 0-} \beta(\mu)$. Interpret your result.
- e) Find $\lim_{\sigma \rightarrow 0} \beta(\mu)$. Interpret your result.
- f) Find $\lim_{\sigma \rightarrow \infty} \beta(\mu)$. Interpret your result.
- g) Find $\lim_{n \rightarrow \infty} \beta(\mu)$. Interpret your result.