

# Assignment 1 – Hypothesis Testing and Error

## Introduction:

In statistical hypothesis testing we usually characterize the question as two choices, the null hypothesis (usually of no effect) and the alternative hypothesis. Then we collect some data and draw a conclusion. There are four possible outcomes, and two kinds of mistakes. We can reject the null when it is true, and we can fail to reject the null when it is false.

For simple hypothesis tests concerning a population mean we rely upon the central limit theorem. The CLT allows us to make probability statements about estimates of the population mean regardless of the distribution of the underlying population.

## Objectives:

Using simulation, we will demonstrate some properties and implications of hypothesis testing.

## Instructions:

Using the software of your choice, generate 1000 random samples of size 50 from a continuous uniform distribution on the range  $\{0,6\}$ . Then:

- 1) Test  $H_0: \mu = 3.0$  against  $H_a: \mu \neq 3.0$  using  $\alpha = 0.05$  for each sample, individually. Then calculate the proportion where you reject  $H_0$ . How does this compare to what you expect?
- 2) Now test  $H_0: \mu = 2.4$  against  $H_a: \mu \neq 2.4$  using  $\alpha = 0.05$  for each sample and calculate the proportion where you reject  $H_0$ . How does this differ from 1) and compare to what you expect?
- 3) Repeat 2) using a 1000 random samples of size 100. How does the result differ from the one you obtained in 2)?

## Product:

Summarize your answers briefly and submit them along with some output from the computer software showing your work. For example, if you use Excel, send me your workbook. If you use R, just send me your script.

## Due Date:

04 February 2009.