

**STATISTICAL METHODS II  
ASSIGNMENT 01  
DUE: 18 JANUARY 2011  
(VERSION 2)**

Because I did not get as far as I needed to get, I am revising the homework.

This homework assignment deals with problems from all previous chapters in the text. Please make sure you read the questions thoroughly and think about them *before* you begin your answer.

Problems 1 and 2 are the same as the first version. Problem 3 has changed.

If you have any questions or issues, let me know as soon as possible.

Good luck!

## PROBLEM 01.1

[[5]]

Using both the tables at the back of the book and the R statistical environment, calculate the following probabilities. Of course, you will have to estimate the actual probabilities using the tables, but come close. Remember, you will need to attach your R script to the end of this homework assignment. Make sure you appropriately use comments in your R script.

In each of these problems, let  $Z \sim \mathcal{N}(\mu = 0, \sigma^2 = 1)$ ,  $T \sim t(dF = 4)$ ,  $X \sim \mathcal{N}(\mu = 5, \sigma^2 = 3)$ , and  $R \sim \chi^2(dF = 6)$ .

(1)  $\mathbb{P}[Z > 1]$

(2)  $\mathbb{P}[|Z| > 1]$

(3)  $\mathbb{P}[|T| < 1]$

(4)  $\mathbb{P}[|X + 1| < 6]$

(5)  $\mathbb{P}[3 < R < 5]$

## PROBLEM 01.2

[[2]]

Calculate the power of an appropriate test of means, with  $\alpha = 0.05$ , and with the competing hypotheses being

$$H_1 : X \sim \mathcal{N}(\mu = 2, \sigma^2 = 1)$$

$$H_2 : X \sim \mathcal{N}(\mu = 4, \sigma^2 = 1)$$

## PROBLEM 01.3

[[3]]

Calculate a power curve using R and the script we went through in class on Thursday. The script (with many annotations) is available online on the “Topics” link.

The null hypothesis is

$$H_0 : X \sim \mathcal{N}(\mu = 0, \sigma = 4)$$

The alternative hypothesis is

$$H_A : X \sim \mathcal{N}(\mu > 0, \sigma = 4)$$

As usual,  $\alpha = 0.05$ .

Notice that the null hypothesis is a simple hypothesis, but the alternative is a compound hypothesis. Modify Part II (in that script) to calculate the power curve for these hypotheses. Note that you will have to use the second version (changing mean) and change the parameters to

```
m0 <- 0; s0 <- 4; mA <- 0; sA <- 4; alpha <- 0.05
```

and the mean calculation to

```
mA <- i/5
```

When you have successfully run this script, please save the graph produced by right-clicking on it and saving it in your assignments folder (hopefully in a subfolder called “assignment01”). Select the ‘Save as metafile...’ option.