

# Basic Data Analysis

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Business Administration and Public Policy

Homework 4: Due June 2, 2011

## Requirements

Homework assignment on the normal distribution.

## Homework 4

Due Thursday, 2010-06-02, 11:45 am. Submit by email to `data-hw@turnbull.sk.tsukuba.ac.jp`. Your header should look like this:

```
From: a-student@sk.tsukuba.ac.jp
To: homework@turnbull.sk.tsukuba.ac.jp
Subject: Basic Data Analysis HW#3
```

The subject should be all half-width Roman letters (ASCII).

1. Sketch (by hand) the standard normal density.
  - (a) On the graph indicate the point  $z_0$  such that  $F(z_0) = 0.5$ .
  - (b) On the graph indicate the point  $z_1$  such that  $F(z_1) = 0.05$ . Shade (color) the part of the graph corresponding to the probability 0.05.
  - (c) On the graph indicate the point  $z_2$  such that  $1 - F(z_2) = 0.10$ . Write the event  $E$  such that  $\Pr(E) = 0.10$  in terms of a standard normal r.v.  $Z$  and  $z_2$ .
  - (d) Write  $\Pr(\{-2.0 < Z \leq 1.0\})$  in terms of  $F$ .
2. (From Freedman, *et al.*, Ch. 5.7, Review Exercise #2.) You are looking at a computer printout of 100 test scores, which have been converted to *standard units*. The first ten entries are

-6.2 3.5 1.3 -0.13 4.3 -5.1 -7.2 -11.3 1.8 6.3

Does the printout look reasonable, or is something wrong with the computer program?

3. (From Freedman, *et al.*, Ch. 4.8, Review Exercise #10.) Incoming students at a certain law school have an average LSAT (Law School Aptitude Test) score of 163 and an SD of 8. Tomorrow, one of these students will be picked at random. You have to guess the score now; the guess will be compared with the actual score, to see how far off it is. Each point of difference will cost you 100 yen. (For example, if the guess is 158 and the score is really 151, you will have to pay 700 yen.)
  - (a) Is the best guess 150, 163, or 170?
  - (b) You have about 1 chance in 3 to lose more than \_\_\_\_\_. (Fill in the blank with one of 100 yen, 800 yen, or 2000 yen.)
4. (From Freedman, *et al.*, Ch. 6.6, Special Review Exercise #2.) A large, representative sample of Americans was studied by the Public Health Service, in the Health and Nutrition Examination Survey (HANES2). The percentage of respondents who were left-handed decreased steadily with age, from 10% at 20 years to 4% at 70. The data show that many people change from left-handed to right-handed as they get older. True or false? Why? If false, what alternative explanation do you propose?