

STATISTICS 4C03/6C03 Assignment #2

Due 2006-01-30 13:30

Part A

Program maximum likelihood estimation for the Beta distribution in R, in the following four ways. Assume that you are writing library functions that others will be expected to use. Test each method over a full range of cases and sample sizes.

1. Use Fisher scoring to solve the likelihood equations.
2. Use `nlm()` to maximize the log-likelihood.
3. Same as (2) but provide the gradient as well as the log-likelihood.
4. Same as (3) but provide the Hessian as well as the log-likelihood and the gradient.

Part B

Here are 20 observations from a Beta(a , b) distribution.

```
0.2691 0.8532 0.8898 0.5609 0.4778 0.5847 0.3129
0.1773 0.2394 0.3885 0.3794 0.5598 0.6687 0.4766
0.4856 0.2827 0.6765 0.3996 0.4395 0.6841
```

Find the maximum likelihood estimates of a and b and their standard errors.

Draw a 95% confidence region for a and b jointly.

Test the hypothesis that $a = b$.

Assuming that $a = b$, find the MLE of the common value a and give a 95% confidence interval.