Bios 7345, Fall 2017
Lab #8: Newton-Raphson

November 29, 2017

Using example 4.2 in the Dobson text (failure times for pressure vessels), with data posted on Brightspace, complete the following:

Table 4.2 *Details of Newton-Raphson iterations to obtain a maximum likelihood estimate for the scale parameter for the Weibull distribution to model the data in Table 4.1.*

Iteration	1	2	3	4
θ	8805.9	9633.9	9876.4	9892.1
$U \times 10^6$	2915.10	552.80	31.78	0.21
$U' \times 10^6$	-3.52	-2.28	-2.02	-2.00
$\mathrm{E}(U') \times 10^6$	-2.53	-2.11	-2.01	-2.00
U/U'	-827.98	-242.46	-15.73	-0.105
$U/\mathrm{E}(U')$	-1152.21	-261.99	-15.81	-0.105

1. Program the Fisher Scoring algorithm to reproduce the results in Table 4.2, but increase the number of columns to 10 (i.e. 10 iterative loops instead of 4)
2. Verify that you get a nearly identical estimate of θ using both the observed information and the expected information. Which one did the book use to obtain $\hat{\theta}$?
3. Calculate the standard deviation of the proposed estimate of θ
4. Why are the values of U, U/U' and U/E(U') equal to 0 after 4-5 iterations?