Problem Set 4

Due Tuesday, November 3.

1. Consider the multiple regression model with Gaussian errors:

\[ Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + u_i. \]

Compute the Wald statistic for the following nonlinear hypothesis:

\[ \beta_0^2 + \beta_1 \beta_2 = 9 \]

a. Using the data in ps4_delta.wf1, parametrically bootstrap the Wald test of the nonlinear hypotheses. Use the bootstrap critical values to test the null.

b. Compare your results in part a with what you would find if you assumed that the asymptotic distribution of the Wald tests was valid in finite samples.

2. Consider the following nonlinear regression function:

\[ y_i = \beta^2 x_{1i} + \sqrt{\beta} x_{2i} + u_i, \]

where \( u_i \sim iid(0, \sigma^2) \). Using the data in ps4.wf1, write a Gauss program to compute the Gauss-Newton NLS estimate of \( \beta \). Choose \( \beta^1 = 1 \) as your starting value. Specify a maximum of 500 iterations, and a convergence criterion of \( 10^{-5} \). Report the NLS estimate of \( \beta \), as well as its 95% asymptotic confidence interval.