STA 5207 Assignment 2

Due Friday September 17

The abundance of spiders (*y*) was counted in 28 sites in a Dutch dune area. There were 4 predictors (*x*1, *x*2, *x*3, and *x*4) that described the physical characteristics of the sites. The data is given in “spider.txt” (no headings), with the response listed first. Use 5% significance level for all tests. Each part is 25 points.

1. Test for the influence of *x*2 on *y* after considering *x*1 and *x*4. Give the hypotheses and models under each. Use the test statement to calculate the F statistic and obtain the sums of squares needed to compute it. Note that the larger model contains *x*1, *x*2, and *x*4. It is not the full model in this case.
   1. vs
   2. F = 17.139 SSE(x1,x4) = 8.4444, SSE(x1,x2,x4) = 4.9263
2. Provide a test to compare the following two models:

E(*y*) = β0 + β1*x*1 + β2*x*2 + β3*x*3 + β4*x*4 and E(*y*) = β0 + β1*x*1 + β3*x*3 + β4*x*4

Give the hypotheses, test statistic, P-value, and conclusion. Also show how the test statistic is computed using sums of squares.

* 1. F = 4.5506 P-value = 0.0438
  2. Reject H0 for significance level of 0.05. There is an overall regression relationship between x2 and the response.
  3. = 4.55

1. Provide a test for the contribution of adding *x*3 and *x*4 to a model containing only *x*1.

Give the model under H0.

Give the hypotheses, test statistic, P-value, and conclusion. Also show how the test statistic is computed using sums of squares.

* 1. Model: E(*y*) = β0 + β1*x*1
  2. H0: β2 = β3 = β4 = 0 H1: β3, β4 ≠ 0
  3. F = 8.011 P-value = 0.002162
  4. Reject H0. x3 and x4 have a significant contribution to the model after considering x1.
  5. = 8.011

1. Test H0: β1 = β2 when the full model is considered. Give the model under H0.

Give the test statistic, P-value, and conclusion. Also show how the test statistic is computed using sums of squares.

* 1. Model: E(y) = β0 + β1(*x*1+x2) + β3*x*3 + β4*x*4
  2. F = 22.77 P-value = 8.223e-05
  3. Reject H0.

You do not need to provide output or code.