MATH 3070: Statistical Report Assignment No.4

Data set for each problem is available at e-Statistics. Go under the title “Data in Statistical Studies” → “Textbook Data Sets.”

1. (Sample assignment problem) The data set is available under the title “Textbook Data Sets” → “Hatching of cuckoo eggs.” Cuckoos place their eggs in other birds' nests for hatching and rearing. Several observations indicate that cuckoos choose the “adoptive parents” carefully, such that the cuckoo eggs are similar in size and appearance to the eggs of the adoptive species. In order to examine this further, researchers investigated 154 cuckoo eggs and measured their size ([Latter, 1905](http://e.pub/vsaknoohmscav5hpi6za.vbk/OPS/loc_015.xhtml#eid17657)). The unit is half millimeters. The width of the eggs ranges from 30 half millimeters to 35 half millimeters. The eggs were adopted by three different species: wrens, redstarts, and whitethroats.
   1. Make sure you understand the structure of the data in the one-way ANOVA model. In particular, what are *n* and *k*?
   2. Analyze the data and draw conclusions. This includes: specification of ANOVA model, hypotheses, and *p*-value; numerical results in the form of relevant estimates, confidence intervals, and their interpretation.
2. Report your findings regarding “Tartar for dogs” (Textbook dataset from Ekstrom and Sorensen). A dog experiment was carried out in order to examine the effect of two treatments on the development of tartar. Apart from the two treatment groups there was also a control group. Twenty-six dogs were used and allocated to one of the three groups, denoted control (standard feed), P2O7 (pyrosulphate added to the feed), and HMP (hexametaphosphate added to the feed). After four weeks each dog was examined and the development of tartar was summarized by an index taking into account the spread of tartar on the teeth as well as the thickness of the tartar. In this investigation, answer the following study questions:
   1. Convince yourself that this is a one-way ANOVA setup. Describe the within-group variation and the between-group variation.
   2. Produce ANOVA table. What is the control group? Does the analysis indicate effect of treatment? If so, which treatment, P2O7 or HMP, seems more promising?