## Activity 4: ANOVA

**Psychological Profiles** Researchers wanted to determine if the psychological profile of healthy children was different than for children suffering from recurrent abdominal pain (RAP) or recurring headaches. A total of 210 children and adolescents were studied and their psychological profiles were graded according to the Child Behavior Checklist 4–18 (CBCL). Children were stratified in two age groups: 4 to 11 years and 12 to 18 years. The results of the study are summarized in the following table:

| | $n$ | Sample Mean | Sample Variance | standard deviation |
|---|---|---|---|---|
| Control group | 70 | 11.7 | 21.6 | 4.6 |
| RAP | 70 | 9.0 | 13.0 | 3.6 |
| Headache | 70 | 12.4 | 8.4 | 2.8 |

*Source:* Galli, et al. "Headache and Recurrent Abdominal Pain: A Controlled Study by Means of the Child Behaviour Checklist (CBCL)." *Cephalalgia* 27, 211–219, 2007

(a) Compute the sample standard deviation for each group (rounded to the tenth's place).

(b) What sampling method was used for each treatment group? Explain why the method used in this problem is the best method for this study?

(c) Use a two sample $t$-test for independent samples to determine if there is a significant difference in mean CBCL scores between the control group and the RAP group (assume that both samples are simple random samples).

(d) Is it necessary to check the normality assumption to answer part (c)? Explain why you believe your response is true.

(e) Use the one-way ANOVA procedure with $a = 0.05$ to determine if the mean CBCL scores are different for the three treatment groups [Note: you will need to use the Chi-Square Table to determine your critical value.] the F-test statistic is F = 15.74 and the p-value = 0.0012.

(f) Based on your results from parts (c) and (e), can you determine if there is a significant difference between the mean scores of the RAP group and the headache group? Explain why you believe your response is true.

Critical value is 3.04