

**MTH 316 NONPARAMETRIC STATISTICS**  
**Homework #10 (Due Thursday, November 21)**

The following exercises are from Chapter 11, pages 344–346.

1. Problem 11.2
2. Problem 11.7
3. Problem 11.8. NOTE: Instead of the Theil-Kendall method, use the rank-based method discussed in class. In addition, estimate the standard deviation of ammonia concentration.
4. Problem 11.11
5. The electronic memory game Simon was first introduced in the late 1970s. In the game there are four colored buttons which light up and produce a musical note. The device plays a sequence of light/note combinations and the goal is to play the sequence back by pressing the buttons. The game starts with one light/note and progressively adds one each time the player correctly recalls the sequence.

Suppose the game were played by a set of statistics students in two classes (time slots). Each student played the game twice and recorded his or her longest sequence. The results are in the dataset **simon**.

**Regression toward the mean** is the phenomenon that if an observation is extreme on the first trial it will be closer to the average on the second trial. In other words, students that scored higher than average on the first trial would tend to score lower on the second trial and students who scored low on the first trial would tend to score higher on the second.

- a. Obtain a scatterplot of the data.
- b. Overlay a rank-based linear fit of the data. Also overlay the line  $y = x$ .
- c. Obtain a rank-based estimate of the slope of the regression line as well as an associated confidence interval.
- d. Obtain a rank-based estimate of the standard deviation of  $Y$ .
- e. Do these data suggest a regression toward the mean effect? Please explain.