Name _____ Date _____

Imagine a task where subjects are given a target stimulus (e.g., the letter "e"), to which he/she is to identify in a display. Each display, however, can contain a varying number of other letters (e.g., "p", "t", "m", etc). Furthermore, on every trial there is a 50% chance that the target letter is present. The experimenter wants to know how quickly the subject can identify whether the target letter is present in the display. The experimenter expects the subject's response time to be a function of the number of other letters in the display (e.g., more time if there are more "other" letters). The experimenter asks the subject to indicate whether target is present by pressing a button. The experimenter records the time between presenting the display and the subjects response (in milliseconds, that is 1000^{th} of a second). (Sternberg (1966) did exactly this, read the enclosed paper for more information on the experiment if you are interested). But there are two possible ways to have subjects respond. First, subjects can press one button if the target is present and another if the target is absent. We call this the "afc' response. Alternatively, subjects can press one button if the target is present and do nothing if the target is absent. We call this the "go-no-go" response. The experimenter wants to know whether these two response types produce the same pattern of data.

Below is a data set that I collected last year on this topic. The first column is the subject's ID number, the second column is the response condition that the subject is in (afc vs go-no-go). The third column is the intercept of that subject's reaction time (in milliseconds). This number represents the time it takes the subject to respond, if the target is present, there are no "other" letters on the display. The forth column is the subject's reaction time (in milliseconds) that needs to be added to the intercept for every "other" letter on the screen. Finally, the fifth column is the subject's error rate. For example, subject "2" was in the "afc" condition and took 694 ms to press a button indicating that the target was present when no other letters were on the display. However, for every extra "other" letter, subject 2 took 25.9 ms more. So, if there was one other letter and the target, the subject took 694+25.9 = 719.9ms, if there were 2 other letters and the target the subject took 694 + 25.9 + 25.9 = 745.8 ms (and so on). Subject 2 had a 1% error rate.

Please use the data set provided for the following questions using SAS when possible, (adopt a two-tailed alpha = .05): The variables are, in the following order, Subject #, responseType, Intercept, Slope, ErrorRate.

1) Please create stem and leaf plots for the two response types for the intercepts and for the slopes of the data.
2) Please create side by side boxplots comparing the two response types error rates (Hint: use the "by" statement).
3) Please give the mean, median, and mode, variance, standard deviation, and SE of the intercepts, slopes and error rates for each response type.
4) Are the three DVs normally distributed?
5) Do the two groups have the same intercept, slope, error rate? Assume that the variances are equal.
6) What was your probability of a Type I and II error for each of the tests in (5; Should probably do by hand)?
7) What was your power for each of the tests in (5)?
8) Unfortunately, reaction times are not very good measures when error rate is too high. Therefore we often eliminate all subjects with an error rate over 10%. When you do this, are the *slopes* of the two groups the same?
9) What conclusions can you make about the two different types of responses, based on the tests that you just performed? Was the power adequate for the tests? Why?