Homework 13 **Name:** _____
Biostatistics (STAT:3510; Bognar)

Print this pdf file (do not use notebook paper), show your work in the provided space, use a scanning app to scan pages (in order) into a single pdf file, submit in Gradescope. Be sure to get entire page in each shot — lay each page flat when scanning. You can use an iPad/tablet too. The Gradescope app works well for submitting too. Make sure the pages upload in order.

1. Textbook 11.4.5: Answer the following only. We will test $H_0 : \mu_1 = \cdots = \mu_5$ versus H_a : not H_0 at $\alpha = 0.10$ significance level. Note: Although we reject H_0, we will NOT do Bonferroni pairwise comparisons in this problem.

   (a) Find the grand mean $\bar{x}$, $MS(between)$, and $MS(within)$.

   (b) Find the test statistic F^*.

   (c) Find the critical value using the app at `https://homepage.divms.uiowa.edu/~mbognar/applets/f.html`.

   (d) Plot the rejection region (be sure to label the distribution on your graph), and state your decision and final conclusion.

(e) Find the $p-$value for the test using the app at `https://homepage.divms.uiowa.edu/~mbognar/applets/f.html`.

(f) Based upon the $p-$value, is there evidence that differences exist between the population means? Why?

2. Textbook 11.4.6: Answer the following only. We will test $H_0 : \mu_1 = \mu_2 = \mu_3$ versus H_a : not H_0 at $\alpha = 0.01$ significance level.

(a) Find the grand mean $\bar{x}$, $MS(between)$, and $MS(within)$.

(b) Find the test statistic F^*.

(c) Find the critical value using the app at `https://homepage.divms.uiowa.edu/~mbognar/applets/f.html`.

(d) Plot the rejection region (be sure to label the distribution on your graph), and state your decision and final conclusion.

(e) Find the $p-$value for the test using the app at `https://homepage.divms.uiowa.edu/~mbognar/applets/f.html`.

(f) Based upon the $p-$value, is there evidence that differences exist between the population means? Why?

(g) Perform all Bonferroni pairwise comparisons by using the $p-$value method. For one of the comparisons, you will have to make use of the app at `https://homepage.divms.uiowa.edu/~mbognar/applets/t.html` to find the exact $p-$value; we can't make the decision with our table alone.

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(h) Based upon your answer in part (2g), where do the differences exist between the means?