**Statistics 251: Lab 6 Handout**

First Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Last Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Students should write the name they are registered with. Do not put nicknames/short forms on the handout. Please write down your answers neatly and do show your work (including R code).

Please use proper notations in your solutions.

1. Do a simulation. **(15 min)**

Draw 10,000 samples of size 10 from the distribution of interest, and calculate the value of each of the above three estimators , , for each of the 10,000 samples. Give your R code. [Hint: Think of how to obtain the estimates for one sample. Repeat using a for loop.]

1. Examine your results and make a decision. **(15 min)**
   1. Compare the center and spread of the results using suitable plots. [Hint: which plot helps to visualize the center and spread of the distribution: a histogram, a boxplot, or another plot?] Give your plot and codes.
   2. Compare the center and spread of the results using suitable summary statistics.

|  |  |  |  |
| --- | --- | --- | --- |
| Estimator |  |  |  |
| Center (state which measure you used) |  |  |  |
| Spread (state which measure you used) |  |  |  |

* 1. Which point estimator would you choose as the best to estimate the population variance? [Hint: Recall that one of the vital properties of an estimator is that it should be **unbiased**. That is, it should be close to the population parameter it is trying to estimate on average.]
  2. Briefly justify your choice of the point estimator.

1. Other questions: **(5 min)**
   1. Generate a suitable plot of the results for the estimator you chose, and describe the shape of the distribution. (Skewed or approximately symmetric? If skewed, in which direction is it?).
   2. Are there any disadvantages to using a *point estimate* to estimate the *population parameter*? Explain why or why not. **(5 min)**