BUS 310, Exam #1, Part I, Spring 2019   Name _____

                                              Section _____

Instructions: This exam is in three parts: Part I is to be completed partly at home using the materials posted on Blackboard for Part I and you will answer questions about that work in class below; Part II and Part III are to be completed entirely in class. You may not use cell phones, and you may only access internet resources you are specifically directed to use.

Part I: At home, open the data file entitled **310exam1part1data.xlsx** posted in Blackboard. Complete the calculations noted below. You will be asked for additional analysis and interpretation of this data in the in-class portion of the test. Bring the file with you on a flash drive, or upload to Exam #1, Part I (Take-Home) in Blackboard (this submission will not be graded: the file will need to be reuploaded to Blackboard as part of the complete exam; it's just for you to have access to your calculations during the test).

1. A coal mining company owns mines in two different locations. Each day, mine 1 produces two tons of anthracite, 4 tons of ordinary coal, and 7 tons of bituminous coal. Each day, mine 2 produces 10 tons of anthracite, 5 tons of ordinary coal and 5 tons of bituminous coal. It costs the company $150 per day to operate mine 1, and $200 per day to operate mine 2. An order is received for 80 tons of anthracite, 60 tons of ordinary coal, and 75 tons of bituminous coal. If the variables are the number of days each mine operates, minimize the cost of operating the mines to fulfill the order. Formulate and solve your model with Solver. Be prepared to apply appropriate terminology to your model and interpret the results. Use Desmos (or another graphing program) to produce a graph of your model. Run a sensitivity report and be prepared to discuss the shadow prices.

2. Sheets 2A, 2B, and 2C contain data to be used to complete the following problems. Treat the data as the sampling frame.
    a. Using the data on weight of a particular small animal on Sheet 2A, find a simple random sample of size 10, and a systematic sample of size 10. If you use the Data Analysis Tool Pack, include screenshots of your settings in your submitted work. Find the mean and standard deviations of your sample.
    b. On Sheet 2B are data on age separated into 50 clusters. Select a cluster sample by selecting 3 clusters to form the sample and then calculate a 90%, 95%, and 98% confidence intervals for the mean.
    c. On Sheet 2C is data on credit card debt on a single credit card. The data is separated into strata by gender. Calculate the following: A stratified sample of 10 (5 from each gender), and a simple random sample that ignores gender. Find the 95% confidence interval for both samples.
    d. Create a graph or set of descriptive stats of all the data on each sheet and be prepared to compare your sampling results with this data. Be prepared to interprets and explain your results.

3. On sheet #3, you will find data on customer gender and purchase value. Treat the entire data set as the sample.
    a. Find the 90% and 99% confidence interval for the difference of means of purchase price by gender.

b. Find the proportion of the sample that are male and construct a 97% confidence interval for the proportion of males of all customers.
c. Be prepared to interpret your intervals.
d. Test for normality (by constructing an appropriate graph) for the means data.