STAT 305- Homework 11

This homework is optional

Due December 12, 2019 in class

I will drop the lowest HW grade. So, this homework is optional to turn in

Show **all** of your work on this assignment and answer each question fully in the given context.

*Note:*You can email your homework only if you cannot attend the class to submit your homewok. If you do so, email your homework by the noon of the due date.

Please staple your assignment!

1. [Ch 6, Exercise 2, pg. 427] Consider the situation of Example 1.1 in Chapter 1 in the notes (involving the heat treatment of gears):

A process engineer is faced with the question, "How should gears be loaded into a continuous carburizing furnace in order to minimize distortion during heat treating?" The engineer conducts a well-thought-out study and obtains the runout values for 38 gears laid and 39 gears hung.

hung	laid
7, 8, 8, 10, 10, 10,	5, 8, 8, 9, 9, 9, 9,
10, 11, 11, 11, 12,	10, 10, 10, 11, 11,
13, 13, 13, 15, 17,	11, 11, 11, 11, 11,
17, 17, 17, 18, 19,	12, 12, 12, 12, 13,
19, 20, 21, 21, 21,	13, 13, 13, 14, 14,
22, 22, 22, 23, 23,	14, 15, 15, 15, 15,
23, 23, 24, 27, 27,	16, 17, 17, 18, 19,
28, 31, 36	27

Table 1: Thrust face runouts (.0001 in.)

a) Use the six-step significance-testing format to assess the strength of the evidence collected in this study to the effect that the laying method is superior to the hanging method in terms of mean runouts produced.[5 pts]

b) Make and interpret 90% two-sided and one-sided condifence intervals for the improvement in mean runout produced by the laying method over the hanging method (for the one-sided interval, give a lower bound for $\mu_{\text{hung}} - \mu_{\text{laid}}$).[5 pts]

c) Make and interpret a 90% two-sided confidence interval for the mean runout for laid gears.[5 pts]

2. [Ch. 6, Exercise 6, pg. 428] Losen, Cahoy, and Lewis measured the lengths of some spanner bushings of a particular type purchased from a local machine shop. Two students measures each ff the outside diameters of each of the sixteen bushings, with the results below.

Bushing	1.000	2.0000	3.0000	4.0000	5.0000	6.00	7.0000	8.000
Student_A	0.369	0.3690	0.3690	0.3700	0.3695	0.37	0.3695	0.369
Student_B	0.369	0.3695	0.3695	0.3695	0.3695	0.37	0.3700	0.369

Bushing	9.000	10.0000	11.0000	12.0000	13.0000	14.0000	15.000	16.000
Student_A	0.369	0.3695	0.3690	0.3690	0.3695	0.3700	0.369	0.369
Student_B	0.370	0.3690	0.3695	0.3695	0.3690	0.3695	0.369	0.369

a) If you want to compare the two students' average measurements, the methods of Two-sample data are inappropriate. Why?[5 pts]

b) Make a 90% two-sided confidence interval for the mean difference in outside diameter measurements for the two students.[5 pts]

3. [Ch. 9.1, Exercise 1, pg. 674] Return to the data from Homework 4, Exercise 1. The article "Polyglycol Modified Poly (Ethylene EtherCarbonate) Polyols by Molecular Weight Advancement" by R. Harris (*Journal of Applied Polymer Science*, 1990) contains some data on the effect of reaction temperature on the molecular weight of resulting poly polyols. The data for eight experimental runs at temperature 165Â°C and above are as follows (see website for `polyols.csv`):

Pot temperature (Â°C)	Average molecular weight
165	808
176	940
188	1183
205	1545
220	2012
235	2362
250	2742
260	2935

a) Find s_{LF} for these data. What does this intend to measure in the context of the engineering problem?[5 pts]

b) Give a 90% two-sided confidence interval for the increase in mean average molecular weight that accompanies a 1Â°C increase in temperature here.[5 pts]

c) Give individual two-sided confidence intervals for the mean average molecular weight at 212Â°C and also at 250Â°C.[5 pts]

Total: 40 pts