Statistics 101B - Spring 2020
Homework 2 (Due Saturday April 18 at 5:00pm)

** Please upload your homework on CCLE. Please write your full name, student ID number, and section number on your homework. Must be PDF.
NO late work will be accepted!**
You do not need to write the questions in your homework. Please show your work!

1. A computer ANOVA output is shown below. Fill in the blanks. You may give bounds on the P-value.

One-way ANOVA

Source	DF	SS	MS	F	P
Factor	?	?	246.93	?	?
Error	25	186.53	?		
Total	29	1174.24			

2. A pharmaceutical manufacturer wants to investigate the bioactivity of a new drug. A completely randomized single-factor experiment was conducted with three dosage levels, and the following results were obtained.

Dosage	Observations			
20g	24	28	37	30
30g	37	44	31	35
40g	42	47	52	38

(a) Do all the necessary calculations for the ANOVA table (by hand)

(b) Using R, show the ANOVA table results.

(c) Is there evidence to indicate that dosage level affects bioactivity? Use $\alpha = 0.05$.

(d) Would it be appropriate to make comparisons between the pairs of means. Why?

(e) If it is appropriate to do so, make comparisons between the pairs of means (using the Tukey method). What conclusions can you draw? Show your work.

(f) Analyze the residuals from this experiment and comment on the model adequacy.

3. A manufacturer of television sets is interested in the effect of tube conductivity of four different types of coating for color picture tubes. A completely randomized experiment is conducted and the following conductivity data are obtained:

Coating Type	Conductivity			
1	143	141	150	146
2	152	149	137	143
3	134	136	132	127
4	129	127	132	129

(a) Do all the necessary calculations for the ANOVA table (by hand).

(b) Using R, show the ANOVA table results.

(c) Is there a difference in conductivity due to coating type? Use $\alpha = 0.05$.

(d) Compute a 99 percent interval estimate of the mean difference between coating types 1 and 4.

(e) Test all pairs of means using the Tukey method with α=0.05.

(f) Analyze the residuals and draw conclusions about model adequacy.

4. Suppose that four normal populations have means of $\mu_1 = 50$, $\mu_2 = 60$, $\mu_3 = 50$, and $\mu_4 = 60$. How many observations should be taken from each population so that the probability of rejecting the null hypothesis of equal population means is at least 0.90? Assume that $\alpha = 0.05$ and that a reasonable estimate of the error variance is $\sigma^2 = 25$.