

Homework 3

PSTAT 120C

Summer 2022 Session B

Reading

The purpose of this portion of the assignment is to guide your reading and help you generate concise reading notes that list the key concepts – generally, terminology, definitions, and theorems. For the submission, treat each bullet point as an exercise and submit your ‘answers’ as you would a problem set.

- Define the ANOVA procedure in your own words. How does the model detect a difference in means by comparing variances?
- Write equations for the following in a general one-way ANOVA:
 - The total sum of squares:
 - The sum of squares for treatment:
 - The sum of squares for error:
- What are the null and alternative hypotheses for a one-way ANOVA?
- What assumptions should be met when we conduct an ANOVA F-test?
- Write the general statistical model for a one-way ANOVA.
- Write the general statistical model for a two-way ANOVA.

Practice

The purpose of this portion of the assignment is to help you practice applying concepts in the reading, and in some cases, establish results that will be used later on. Remember that you will be graded on problem attempts, not solutions; do your best and ask questions if you get stuck.

1. The Florida Game and Fish Commission desires to compare the amounts of residue from three chemicals found in the brain tissue of brown pelicans. Independent random samples of ten pelicans each yielded the accompanying results (measurements in parts per million). Is there evidence of sufficient differences among the mean residue amounts at the 5% level of significance?

	Chemical		
Statistic	DDE	DDD	DDT
Mean	.032	.022	.041
Standard deviation	.014	.008	.017

2. It has been hypothesized that treatments (after casting) of a plastic used in optic lenses will improve wear. Four different treatments are to be tested. To determine whether any differences in mean wear exist among treatments, 28 casting from a single formulation of the plastic were made and 7 castings were randomly assigned to each of the treatments. Wear was determined by measuring the increase in “haze” after 200 cycles of abrasion (better wear being indicated by smaller increases). The data collected are reported in the accompanying table.

Treatment			
A	B	C	D
9.16	11.95	11.47	11.35
13.29	15.15	9.54	8.73
12.07	14.75	11.26	10.00
11.97	14.79	13.66	9.75
13.31	15.48	11.18	11.71
12.32	13.47	15.03	12.45
11.78	13.06	14.86	12.38

- Is there evidence of a difference in mean wear among the four treatments? Use $\alpha = 0.05$.
- Estimate the mean difference in haze increase between treatments B and C using a 99% confidence interval.
- Find a 90% confidence interval for the mean wear for lenses receiving treatment A.

3. Fill in the blanks in the following two-way ANOVA table, using the information provided:

Source	SS	df	MS	F
Block		7		14.5
Treatment	5797.5		1932.5	
Interaction	11363.1			
Error	14841.6		154.6	
Total		127		