Statistical Methods II MATH 536 EVALUATION #2 [100 pts] --- SPRING 2021 --- KSR

You may use MINITAB, SAS, R, Web Applets, etc. ...
please provide the output to support and justify your answers; when appropriate.

Please make the write-up: organized, presentable, etc.

PROBLEMS or QUESTIONS: SEE THE INSTRUCTOR IMMEDIATELY.

You may use textbooks, notes from this class, computer packages,
BUT you are not to consult other individuals, except the instructor.

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Whenever possible data-sets should be analyzed using descriptive techniques:
(both graphical and numerical).

All analyses (testing, confidence intervals, etc.) should have
conclusions/interpretations worded in terms of the problem.

Reject H_0 or (1.2, 5.3) is not a sufficient what do these things mean;
answer the question of interest, etc.

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1) [8 PTS]

pages 1085-1086 # 17.15

2) [12 PTS]

A common method of assessing cardiovascular capacity is through treadmill
exercise testing. Maximal oxygen uptake, or VO2 max, is an index measured using a
treadmill with an inclined protocol.

A random sample of n = 12 adults was randomized to two treatment groups:

T1: 12 week step-aerobic training program
T2: 12 week outdoor running regimen on flat-terrain.

The change in VO2 max = y is the response. Ages of subjects are also measured.

The point of the study is to see if the first treatment group shows greater
increases in VO2 max than the 2nd. DATASET = cardo.txt

COMPLETE A FULL AND APPROPRIATE ANALYSIS OF COVARIANCE
{..., give model, check for common slopes[graphical and inference],
{inference for treatments, conclusions, ...

3) [12 PTS]

pages 1130-1132 # 18.28 DATASET = ex18-28.txt

4) [8 PTS]

Two irrigation levels and four varieties of wheat are to be studied in terms of the growth of wheat using eight growth chambers. Each growth chamber will be assigned a level of irrigation at random with 4 getting level 1 irrigation and 4 getting level 2 irrigation. There were 4 pots in each growth chamber which could be assigned at random to one of the four varieties of wheat.

Identify the different sizes of experimental units (draw a diagram).

Write out a model to describe the data from this experiment and write out the analysis of variance table [source, df, E(MS)].

5) [12 PTS]

A supermarket chain studied the relationship between grapefruit sales and the price at which grapefruits are offered. Three price levels were studied: (1) the chief competitor's price, (2) a price slightly higher than the chief competitor's price, and (3) a price moderately higher than the chief competitor's price. Eight stores were randomly selected for the study. Sales data were collected for each of the price levels, with the order of the three price levels randomly assigned within each store. Data on store sales of grapefruits = GrapefruitSales.txt

Obtain the ANOVA table.

Test whether the mean sales of grapefruits differ for the three price levels ...

Analyze the effects of the three price levels by a multiple comparison procedure --- summarize by a suitable line plot.

6) [12 PTS]

DATASET = AppleSales.txt contains data for a study of three different displays on the sale of apples, using a crossover design. Six stores were used, with two assigned at random to each of three treatment sequences. Each display was kept for two weeks, and the observed variable was sales per 100 customers ... note that since the subject is a store there should be no carry-over effect ... conduct the most appropriate analysis and test all appropriate effects ...

7) [12 PTS]

page 1089 # 17.31 DATASET = ex17-31.txt

8) [12 PTS]

pages 1132-1133 # 18.29 DATASET = ex18-29.txt

9) [12 PTS]

You are consulting with two graduate students studying strawberries, a multiple harvest crop.

Peter is interested in studying cultivars and fertilizers. His experiment is focused upon six cultivars and four fertilizers. In discussion, Peter reveals the smallest area that fertilizers can be applied to hold six cultivars. The large research facility currently has eight such areas available, so each fertilizer will be assigned to two of these areas.

Paul is interested in how cultivar yields vary during the season. Cultivars with high early and late yields are desired since prices are generally highest then. He is planning to study six cultivars; each type of cultivar will be assigned to two plots. Each plot with be harvested four times (early, mid-early, mid-late, late).

At consulting sessions, each tells you that they plan to analyze their data as a 4 x 6 factorial experiment with 2 replications. ... hmmm is this appropriate?

For each critique their plan, provide suggestions,
give an appropriate model, anova [source, df, E(MS)],
discuss implementation of randomization, etc.