Lab #13: One-Way ANOVA

1. Maryanne has been beating her head against the wall all day trying to make sense of a one-way ANOVA on some data from a drug study using Minitab. In this study, the groups receive either a placebo, 1 pill, or 5 pills and higher scores on the DV reveal better performance. Maryanne is confident that she has correctly entered the data and filled in the dialog boxes appropriately. She has spoken with several of her classmates and knows that the ANOVA should be significant, but it just isn't turning out that way. *"The F ratio isn't anywhere near being smaller than the alpha level,"* says Maryanne. Maryanne has the following information from Minitab:

One-way Analysis of Variance

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Source     DF        SS        MS        F        P
Factor      2     345.7     172.9     6.10    0.015
Error      12     340.0      28.3
Total      14     685.7

Level       N      Mean     StDev  ------+---------+---------+---------+
Control     5    43.600     5.030  (--------*-------)
1Pill        5    51.800     4.438                (-------*--------)
5Pills       5    55.000     6.325                     (--------*-------)
                                    -----+---------+---------+---------+
Pooled StDev =    5.323              42.0      48.0      54.0      60.0
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a. Is Maryanne misreading the Minitab data? How should she be reading it?

b. Help Maryanne by explaining the importance of the F ratio (i.e., what is it that we are looking for and why?).

c. What might be Maryanne's conclusion about the differences between groups based on the above data? Support her conclusions with post-hoc comparison tests.

2. An experimenter was interested in the effect of sleep deprivation on the ability to detect moving objects on a radar screen. The 20 subjects were randomly assigned to one of 4 different conditions (0, 12, 24, 36 hours without sleep). Recorded is the number of failures in spotting moving objects during a test period. Conduct the appropriate test using an alpha of .05.

0 hrs	12 hrs	24 hrs	36 hrs
36	38	46	76
21	45	74	66
20	46	67	62
26	22	61	44
21	40	59	61

3. Construct a complete ANOVA summary table from the following information. Also include a description of the number of groups and the number of subjects in each group.

Source	SS	Df	MS	F	p
Between	132.00				
Within			99.75		
Total	1728.00	19			

4. Explain the difference between simple and complex comparisons.

5. If the difference between sample means increases, what will happen to the value of the F-ratio in ANOVA?

a) decreases F, which is good
b) decreases F, which is bad
c) increases F, which is good
d) increases F, which is bad

6. What happens to the value of the F-ratio as the variability within the samples increases?

a) decreases F
b) no effect on F
c) increases F
d) eliminates F