F Distribution and ANOVA: Homework

(1) – (10): Use a solution sheet to conduct the following hypothesis tests.

EXERCISE 1

Three students, Linda, Tuan, and Javier, are given 5 laboratory rats each for a nutritional experiment. Each rat's weight is recorded in grams. Linda feeds her rats Formula A, Tuan feeds his rats Formula B, and Javier feeds his rats Formula C. At the end of a specified time period, each rat is weighed again and the net gain in grams is recorded. Using a significance level of 10%, test the hypothesis that the three formulas produce the same average weight gain.

Linda's rats	Tuan's rats	Javier's rats
43.5	47.0	51.2
39.4	40.5	40.9
41.3	38.9	37.9
46.0	46.3	45.0
38.2	44.2	48.6

2. A grassroots group opposed to a proposed increase in the gas tax claimed that the increase would hurt working-class people the most, since they commute the farthest to work. Suppose that the group randomly surveyed 24 individuals and asked them their daily one-way commuting mileage. The results are below:

working-class	professional (middle incomes)	professional (wealthy)
17.8	16.5	8.5
26.7	17.4	6.3
49.4	22.0	4.6
9.4	7.4	12.6
65.4	9.4	11.0
47.1	2.1	28.6
19.5	6.4	15.4
51.2	13.9	9.3

EXERCISE 3

Refer to (1). Determine whether or not the variance in weight gain is statistically the same among Javier's and Linda's rats.

EXERCISE 4

Refer to (2) above. Determine whether or not the variance in mileage driven is statistically the same among the working class and professional (middle income) groups.

(5) - (6) refer to the data (back of text) from Terri Vogel's Log Book.

EXERCISE 5

Examine the 7 practice laps. Determine whether the average lap time is statistically the same for the 7 practice laps, or if there is at least one lap that has a different average time from the others.

EXERCISE 6

Examine practice laps 3 and 4. Determine whether or not the variance in lap time is statistically the same for those practice laps.

(7) - (10) refer to the following data:

The following table lists the number of pages in four different types of magazines.

	Type of Magazine		
home decorating	news	health	computer
172	87	82	104
286	94	153	136
163	123	87	98
205	106	103	207
197	101	96	146

EXERCISE 7

Using a significance level of 5%, test the hypothesis that the four magazine types have the same average length.

EXERCISE 8

Eliminate one magazine type that you now feel has an average length different than the others. Redo the hypothesis test, testing that the remaining three averages are statistically the same. Use a new solution sheet. Based on this test, are the average lengths for the remaining three magazines statistically the same?

EXERCISE 9

Which two magazine types do you think have the same variance in length?

EXERCISE 10

Which two magazine types do you think have different variances in length?