12.9: Practice

Use the following information to answer the next five exercises. There are five basic assumptions that must be fulfilled in order to perform a one-way ANOVA test. What are they?

1.

Write one assumption.

2.

Write another assumption.

3.

Write a third assumption.

4.

Write a fourth assumption.

5.

Write the final assumption.

6.

State the null hypothesis for a one-way ANOVA test if there are four groups.

7.

State the alternative hypothesis for a one-way ANOVA test if there are three groups.

8.

When do you use an ANOVA test?

Use the following information to answer the next eight exercises. Groups of men from three different areas of the country are to be tested for mean weight. The entries in Table 13.13 are the weights for the different groups.

Group 1	Group 2	Group 3
216	202	170
198	213	165
240	284	182
187	228	197
176	210	201

Table 13.13

9.

What is the Sum of Squares Factor?

10.

What is the Sum of Squares Error?

11.

What is the *df* for the numerator?

12.

What is the *df* for the denominator?

13.

What is the Mean Square Factor?

14.

What is the Mean Square Error?

15.

What is the *F* statistic?

Use the following information to answer the next eight exercises. Girls from four different soccer teams are to be tested for mean goals scored per game. The entries in the table are the goals per game for the different teams. The one-way ANOVA results are shown in Table 13.14.

Team 1	Team 2	Team 3	Team 4
1	2	0	3
2	3	1	4
0	2	1	4
3	4	0	3
2	4	0	2

Table 13.14

16.

What is $SS_{between}$?

17.

What is the *df* for the numerator?

18.

What is $MS_{between}$?

19.

What is SS_{within}?

20.

What is the *df* for the denominator?

21.

What is MS_{within}?

22.

What is the *F* statistic?

23.

Judging by the *F* statistic, do you think it is likely or unlikely that you will reject the null hypothesis?

24.

An *F* statistic can have what values?

25.

What happens to the curves as the degrees of freedom for the numerator and the denominator get larger?

Use the following information to answer the next seven exercise. Four basketball teams took a random sample of players regarding how high each player can jump (in inches). The results are shown in Table 13.15.

Team 1	Team 2	Team 3	Team 4	Team 5
36	32	48	38	41

Team 1	Team 2	Team 3	Team 4	Team 5
42	35	50	44	39
51	38	39	46	40

Table 13.15

26.

What is the *df(num)*?

27.

What is the *df(denom)*?

28.

What are the Sum of Squares and Mean Squares Factors?

29.

What are the Sum of Squares and Mean Squares Errors?

30.

What is the *F* statistic?

31.

What is the *p*-value?

32.

At the 5% significance level, is there a difference in the mean jump heights among the teams?

Use the following information to answer the next seven exercises. A video game developer is testing a new game on three different groups. Each group represents a different target market for the game. The developer collects scores from a random sample from each group. The results are shown in Table 13.16

Group A	Group B	Group C
101	151	101
108	149	109
98	160	198
107	112	186
111	126	160

Table 13.16

33.

What is the *df(num)*?

34.

What is the *df(denom)*?

35.

What are the $SS_{between}$ and $MS_{between}$?

36.

What are the SS_{within} and MS_{within}?

37.

What is the *F* Statistic?

38.

What is the *p*-value?

39.

At the 10% significance level, are the scores among the different groups different?

Use the following information to answer the next three exercises. Suppose a group is interested in determining whether teenagers obtain their drivers licenses at approximately the same average age across the country. Suppose that the following data are randomly collected from five teenagers in each region of the country. The numbers represent the age at which teenagers obtained their drivers licenses.

	Northeast	South	West	Central	East
	16.3	16.9	16.4	16.2	17.1
	16.1	16.5	16.5	16.6	17.2
	16.4	16.4	16.6	16.5	16.6
	16.5	16.2	16.1	16.4	16.8
x¯=x¯=" role="presentation" style="position: relative;">$\bar{x} =$ $\bar{x} =$					
s2=s2=" role="presentation" style="position: relative;">$s^2 =$ $s^2 =$					

Table 13.17

Enter the data into your calculator or computer.

40.

p-value = _____

State the decisions and conclusions (in complete sentences) for the following preconceived levels of α.

41.

$\alpha = 0.05$

a. Decision: _____

b. Conclusion: _____

42.

$\alpha = 0.01$

a. Decision: _____

b. Conclusion: _____

Use the following information to answer the next two exercises. There are two assumptions that must be true in order to perform an *F* test of two variances.

43.

Name one assumption that must be true.

44.

What is the other assumption that must be true?

Use the following information to answer the next five exercises. Two coworkers commute from the same building. They are interested in whether or not there is any variation in the time it takes them to drive to work. They each record their times for 20

commutes. The first worker's times have a variance of 12.1. The second worker's times have a variance of 16.9. The first worker thinks that he is more consistent with his commute times. Test the claim at the 10% level. Assume that commute times are normally distributed.

45.

State the null and alternative hypotheses.

46.

What is s_1 in this problem?

47.

What is s_2 in this problem?

48.

What is n?

49.

What is the F statistic?

50.

What is the p-value?

51.

Is the claim accurate?

Use the following information to answer the next four exercises. Two students are interested in whether or not there is variation in their test scores for math class. There are 15 total math tests they have taken so far. The first student's grades have a standard deviation of 38.1. The second student's grades have a standard deviation of 22.5. The second student thinks his scores are more consistent.

52.

State the null and alternative hypotheses.

53.

What is the F Statistic?

54.

What is the p-value?

55.

At the 5% significance level, do we reject the null hypothesis?

Use the following information to answer the next three exercises. Two cyclists are comparing the variances of their overall paces going uphill. Each cyclist records their speeds going up 35 hills. The first cyclist has a variance of 23.8 and the second cyclist has a variance of 32.1. The cyclists want to see if their variances are the same or different. Assume that commute times are normally distributed.

56.

State the null and alternative hypotheses.

57.

What is the F Statistic?

58.

At the 5% significance level, what can we say about the cyclists' variances?